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NOTES ON NEW ENGLAND HEPATICAE,— IX.

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EXCEPT in New Jersey and California the species of *Riccia* (in its restricted sense) have not been very diligently collected in North America. This has been true even in New England, where the distribution of the Hepaticae has been studied more thoroughly than in most other parts of the United States. Until about a year ago, when *R. sorocarpa* was reported from several localities,[1] *R. arvensis* was the only member of the genus definitely known to occur within our limits. During the past season, however, four additional species have been detected in Connecticut. Three of these, *R. Austini*, *R. dictyospora*, and *R. Lescuriana*, were found in or near New Haven, while the fourth, *R. hirta*, was found near Hartford. These four species, together with *R. arvensis*, are discussed in the present paper. Three other additions to the New England flora are likewise included. The first is *Nardia scalaris*, a species common in Europe but rare in America; the second is an *Odontoschisma* which European writers consider a variety of *O. denudatum* but which seems worthy of recognition as a distinct species; the third is *Anthoceros crispulus*, a species recently segregated from *A. punctatus*. At the close of the paper several additions to local state floras are enumerated.

1. RICCIA ARVENSIS Aust., Proc. Acad. Philadelphia for 1869: 232. Muddy shores of ponds and rivers, more rarely in fields. Rhode Island: listed in Bennett's Catalogue but without definite stations. Connecticut: Hartford (*E. B. Harger*); Wethersfield and West Hartford (*Miss Lorenz*); Orange and Middlefield (*A. W. E.*); East

[1] See Sheldon, Bryologist **13**: 64. 1910. Also Evans, RHODORA **12**: 193. 1910.

Haven (*G. E. Nichols*). The species has been reported also from the following localities: Closter, New Jersey (*Austin*), where the original material was collected; near Hull, Quebec (*Macoun*); Ottawa, Ontario (*Macoun*); near Richmond, Staten Island, New York (*Howe*); Highlands, New Jersey (*Miss Haynes*); Lehigh Mountain, Pennsylvania (*Rau*); Georgetown, District of Columbia (*Coville*).

The color of *R. arvensis* is a dull grayish green, sometimes pigmented with purple along the margin. The older parts of the thallus often show a yellowish hue. Although the species sometimes forms rosettes 0.75–1 cm. in diameter, the plants frequently grow scattered or in irregular mats. Under unfavorable conditions the thallus is minute and unbranched, and specimens with mature capsules have been observed in which the entire plant was only 1 mm. long and 0.5 mm. wide. It is much more usual, however, for the thallus to fork from one to three times, and the branches when well developed measure 1.5–2 mm. in width and 2–3 mm. in length. The terminal branches are very bluntly pointed, rounded, or subemarginate at their extremities and bear on the upper surface a shallow median groove, occupying about one third the width of the thallus. This groove contracts abruptly at the apical end into a very narrow sulcus; toward the base of the branch it usually becomes more or less obliterated, especially after capsules are developed, the upper surface thereby appearing plane or nearly so. In some cases, however, the groove can be demonstrated, more or less clearly, almost to the base of the plant. From the sides of the groove the flanks of the thallus gently curve away, and the branches are bounded laterally by rounded ridges. The ventral scales do not extend beyond the margin; they are usually hyaline and inconspicuous but are sometimes tinged with purple. In most cases cilia are absent altogether. When present they are commonly scanty and poorly developed, being scarcely more than slightly projecting cells with rounded ends. In cross section the lower surface of the thallus is seen to be plane or a little convex in the median region, the sides rising obliquely or abruptly and meeting the upper surface at an angle of 90 degrees or less. The section is therefore approximately a rectangle or trapezoid. The thickness of the thallus is from one third to one half as great as the width. The epidermal cells are thin walled, rounded, and hyaline; they soon collapse and disappear more or less completely, the cells of the next layer then losing their chlorophyll and functioning as an epidermis.

The species is monoicous, and the capsules, which are abundantly produced, are irregularly scattered along the median portion of the thallus. At maturity they can readily be seen through the translucent tissues as a series of dark spots, and when the plants become dry the capsules protrude above the upper surface. The spores are dark brown and average about 85 μ in diameter. All four faces are clearly reticulated, and a distinct wing 5–10 μ wide is developed at the junction between the convex face and the three plane faces. The wing is yellowish brown and crispate, the margin being more or less crenulate and the surface minutely verruculose. On the convex face of the spore there are about eight meshes across the diameter, and the meshes measure about 10 μ in width. In profile view the ridges which bound the meshes appear low but project at the angles of the meshes as truncate points, perhaps 5 μ in length. The plane faces have lower ridges than the convex face but are otherwise much the same.

There seems to be little to distinguish *R. arvensis* from the European plant which is now usually known as *R. bifurca* Hoffm. This species was published in 1795,[1] but the original description is very incomplete and would apply equally well to a number of distinct plants. The type material is apparently no longer in existence. For these reasons the name *R. bifurca,* although it continued to be used by authors, had no definite signification until the end of the last century. As late as 1892 Camus,[2] in reviewing what was known about the species, pronounced it very badly understood and even hypothetical. It was not until 1898, when the subject was investigated by Heeg,[3] that the species became defined in its present sense. He based his conclusions upon the specimens which Lindenberg,[4] in 1836, referred to *R. bifurca,* but unfortunately even these specimens did not lead to definite results. In the fascicle labeled *R. bifurca,* Heeg found four distinct species and simply selected the one which seemed to him to coincide best with Lindenberg's description and figures. He reserved the name for this particular species and referred to *R. bifurca,* as thus restricted, a number of specimens from various localities in Sweden, Switzerland, and Austria. These he described clearly and fully. His conclusions

[1] Deutschlands Flora **2**: 95. 1795.
[2] Bull. Soc. Bot. France **39**: 229. 1892.
[3] Bot. Not. 1898: 107.
[4] Nova Acta Acad. Caes. Leop. Carol. **18**: 425. *pl. 20, f. 1.* 1836.

soon became accepted by European writers, and *R. bifurca* is now recognized as a definite species throughout northern Europe. Whether or not the course pursued by Heeg was justifiable is a question. It would probably have been better if he had given up the name *R. bifurca* altogether and had chosen a new name for the species. At any rate it must be admitted that the present definition of *R. bifurca* is Heeg's and that it is very doubtful whether his conception of the species would agree with Hoffmann's or even with Lindenberg's. In case it should be proved beyond question that *R. arvensis* and Heeg's *R. bifurca* were identical, the writer suggests that the species should bear the name given it by Austin.

One of the closest allies of *R. arvensis* is apparently *R. glauca* L., a common European species which is known in North America from California only. This species is perhaps to be expected in the eastern United States. Its thallus differs from that of *R. arvensis* in having sharper margins and in being relatively thinner, the thickness being only one fourth as great as the width or even less. The spores of *R. glauca* are much like those of *R. arvensis*, except that the meshes of the convex face average a little larger.

2. Riccia Austini Steph., Bull. de l'Herb. Boissier **6**: 336. 1898. *R. lamellosa* Aust., Hep. Bor.-Amer. *140*. 1873 (not Raddi). *R. lamellosa*, var. *americana* M. A. Howe, Bull. Torrey Club **25**: 189. 1898 (in part). On moist black earth in paths among rocks, sometimes in company with *R. Lescuriana* and *R. sorocarpa*. West Rock Ridge, Connecticut; first discovered in the town of New Haven (*G. E. Nichols*, 1911) and afterwards in the town of Woodbridge (*A. W. E.*). Since collected on South Mountain, Meriden, Connecticut (*Miss Lorenz*). The species was based on material collected by Austin near Closter, New Jersey, and issued as *R. lamellosa*. Its geographical distribution is very incompletely known. Underwood [1] reported *R. lamellosa* from Ontario, Alabama, and California, as well as from New Jersey, and the same species is listed without definite stations in Bennett's Plants of Rhode Island. The Californian material in the Underwood herbarium has since been described by Howe [2] as a distinct species under the name *R. americana*, but it is probable that some of the eastern specimens would now be referred to *R. Austini*. Unfortunately the question cannot be answered at the present time.

[1] Bot. Gaz. **19**: 278. 1894.
[2] Mem. Torrey Club **7**: 24. *pl.* 90. 1899.

The true *R. lamellosa* is a species of the Mediterranean region, and all records of its occurrence in North America need careful investigation.

The thallus of *R. Austini* is of a pale glaucous green color and is apparently never pigmented with purple. It sometimes forms a complete rosette about 1.5 cm. in diameter but often fails to do so, and the plants then occur irregularly scattered or in more or less compact mats. The thallus forks from one to three times, the branches measuring 1.5–3 mm. in width and 3–4 mm. in length. The terminal branches taper gradually to blunt points. On the upper surface in the apical region a deep and narrow sulcus is visible, from which the flanks curve abruptly away. The sulcus is usually very short and the older parts of the thallus are plane or nearly so. The ventral scales are large, crowded and hyaline and project considerably beyond the margin of the thallus, thus forming a distinct translucent border. The margins of the scales are either entire or minutely and irregularly crenulate from projecting cells. The plant is quite destitute of marginal or surface cilia. In cross section the lower surface appears plane or slightly convex in the median region, while the sides ascend obliquely and meet the upper surface at a sharp angle of about 60 degrees. The thickness of the thallus is usually from one fourth to one third as great as the width. The epidermis consists of colorless and rounded thin-walled cells, which soon break down. Their place is taken by the second series of cells, which gradually lose their green contents but retain their thin walls.

Although the species is monoicous the capsules are not abundantly produced. In fresh material they are completely hidden until the tissue above them begins to discolor and to become disintegrated. The spores are brown and measure 85–100 μ in maximum diameter The angles between the faces of the spore are rounded, and there is no wing developed at the junction between the convex face and the three triangular faces. The convex face is covered over with anastomosing ridges about 2 μ high, which form a distinct reticulum, and the ridges do not project appreciably at the angles of the meshes. The latter number about nine across the face of the spore and average about 10 μ in width. The triangular faces are marked with still lower ridges, irregularly arranged and not forming a network.

The three related species, *R. Austini, R. americana,* and *R. lamellosa,* form a definite group characterized by a flat thallus destitute of cilia

but bordered by a series of imbricated, hyaline scales. The spores in the two American species afford the best differential characters in separating them from *R. lamellosa,* in which a distinct wing is developed at the junction between the convex face of the spore and the three plane faces. The absence of a wing in the American plants which had been referred to *R. lamellosa* was first pointed out by Underwood.[1] The spores in the true *R. lamellosa* are further distinguished from those of *R. Austini* by their slightly larger size (90–120 μ according to Müller [2]) and by the fact that all four faces are reticulated. In *R. americana,* also, the spores are larger than in *R. Austini,* measuring 90–126 μ according to Howe, and the meshes of the convex face are likewise larger, averaging about 15 μ in width. The thallus has even more conspicuous scales than in the eastern plant and is slightly more robust, measuring 2.5–4 mm. in width. Howe's figures of *R. americana* should be carefully consulted in studying *R. Austini.*

3. Riccia dictyospora M. A. Howe, Bull. Torrey Club **28**: 163. 1901. On moist black earth in a path among rocks, in company with *R. sorocarpa* and *Grimaldia fragans.* West Rock Ridge, Woodbridge, Connecticut (*A. W. E.*). New to New England. Known from only two other stations, namely: Athens, Georgia (*R. M. Harper*), the type locality, and Glencoe, Missouri (*N. L. T. Nelson*). A portion of the original material, kindly communicated by Howe, agrees closely with the specimens from Connecticut, except that the spores are a little larger.

In *R. dictyospora* the color is a more decided green than in either of the preceding species and is only slightly glaucous. The plants sometimes form irregular rosettes 1.5–2 cm. in diameter but are much more likely to grow in intricate mats or irregularly scattered. The thallus is narrow, measuring about 1 mm. in width, and the branches are mostly 2–3 mm. long. They tend to spread less widely than in most species of *Riccia.* The terminal branches have rounded or slightly emarginate apices. Near the tip a narrow median sulcus can be demonstrated, but this extends backward for a short distance only, the older parts of the thallus being plane or nearly so on the upper surface. The thallus is destitute of marginal hairs but bears a series of ventral scales, which extend slightly beyond the margin. These are usually deeply pigmented with purple and form a narrow

[1] Bot. Gaz. **19**: 274. 1894.
[2] Rabenhorst's Kryptogamen-Flora **6**: 187. 1907.

border visible from above. As seen in cross section the lower surface is convex in the median region, the sides rising obliquely and meeting the upper surface at a sharp angle. The thickness of the thallus is usually about half as great as the width. The epidermal layer is composed of thin-walled rounded cells without chloroplasts. These soon collapse and either disappear completely or persist as cup-shaped vestiges. In most cases the second layer of cells, which are likewise rounded and thin-walled, remains intact and assumes the functions of an epidermis.

The plants are monoicous. The capsules are sparingly produced and are difficult to discover until the tissue above them has become broken down. The spores are brown and average about 100 μ in diameter in the type specimen and about 90 μ in the Connecticut material. They agree with the spores of *R. Austini* in having no wing developed at the junction between the convex face and the three plane faces. The whole surface is covered over with a distinct reticulum which is not interrupted even at the rounded angles of the spore. The reticulum is formed by a system of low ridges which project at the angles of the meshes as truncate papillae. These papillae, as Howe shows, are 6–9 μ long on the convex face of the spore and only 4–5 μ on the triangular faces. He brings out the fact also that the meshes on the convex face measure 8–12 μ in diameter, while those on the other faces are slightly larger. Howe's account of the species is so full that the above description adds no new points of importance.

The remarkable spores of *R. dictyospora* will serve to distinguish the species from most of the other members of the genus. In size and general appearance the plant bears considerable resemblance to *R. sorocarpa*, in which the thallus bears a similar narrow sulcus in the apical region. In *R. sorocarpa*, however, the sulcus is even sharper, and the color of the plant is more distinctly glaucous. The species is further distinguished by its delicate and hyaline ventral scales and by its very different spores, which measure 70–90 μ in maximum diameter and develop a distinct though narrow wing. In *R. nigrella* DC. the thallus agrees with that of *R. dictyospora* in being bordered by a series of slightly projecting purple scales. The spores, however, are smaller, measuring 60–80 μ, and are further characterized by the presence of a narrow wing. *R. nigrella* is widely distributed in southern Europe and in North America is definitely known from California. According to Austin it occurs also in New York and Pennsylvania,

but no recent collections of the species have been made in the eastern United States.

4. Riccia hirta Aust., Proc. Acad. Philadelphia for 1869: 232 (as synonym). Underwood, Bot. Gaz. **19**: 274. 1894. *R. arvensis,* var. *hirta* Aust., Proc. Acad. Philadelphia for 1869: 232. In the bed of an old canal. West Hartford, Connecticut (*Miss Lorenz,* 1911). New to New England. The species has a confused history and its range is very incompletely known. It was based on specimens collected by Austin at Closter, New Jersey, and distributed in his Hep. Bor.-Amer. *142* as a variety *hirta* of *R. arvensis*. When Underwood raised the variety to specific rank he associated with it specimens from California and drew his account of the spores largely from these specimens. The Californian plant was soon afterwards described as a distinct species by Howe under the name *R. trichocarpa,*[1] thus leaving nothing except the New Jersey plant to represent the true *R. hirta.* According to Howe the material issued under *No. 142* is not homogeneous, some of it being clearly *R. Lescuriana,* but in the set of Hep. Bor.-Amer. examined by the writer the specimens under this number seem to be free from admixture and agree very well with those from Connecticut. They agree also in most respects with the description of *R. hirta* given by Stephani,[2] assuming that his spore-measurements are increased 20 per cent., as Schiffner [3] suggests. Stephani records the species from Louisiana (*Langlois*), as well as from New Jersey.

The Connecticut specimens of *R. hirta* do not form rosettes but grow in intricate mats. The color is a grayish green, much like that of *R. arvensis,* and the margin is sometimes tinged with purple. An individual thallus is occasionally simple but is usually once to three times dichotomous. It measures 1–1.5 mm. in width, and the branches are mostly 2–3 mm. long. The terminal branches are rounded at the extremity and show a very narrow but shallow median sulcus which extends back from the apex for a distance of about a millimeter. At the basal end the sulcus is usually abruptly obliterated but occasionally widens out into a very short groove. The older parts of the thallus are plane or nearly so on the upper surface. The ventral scales are hyaline and inconspicuous and do not extend beyond the margin. The cilia or hairs, which give the species its

[1] Bull. Torrey Club **25**: 184. *pl.* 337. 1898. Mem. Torrey Club **7**: 17. *pl. 88.* 1899.
[2] Bull. de l'Herb. Boissier **6**: 317. 1898.
[3] Lotos 1901: [7].

name, are not numerous. They are mostly confined to the margin but a few sometimes appear scattered over the upper surface. Those on the margin occur singly or in pairs. The cilia are whitish and usually sharp-pointed and have a length of 0.07–0.15 mm. In cross section the lower surface appears more or less convex in the median region, while the sides rise obliquely and meet the upper surface at a sharp angle of about 60 degrees. The thickness of the thallus is from one third to two thirds as great as the width. The epidermis is much the same as in *R. arvensis.*

The species has a monoicous inflorescence and produces an abundance of capsules, which show more or less clearly through the translucent tissue above them. The mature spores are brown and measure 85–100 μ in maximum diameter. At the junction between the convex face and the three plane faces a narrow wing 5 μ or less wide is developed, and this wing is indistinctly crenulate and very minutely verruculose. The convex face is covered with a regular reticulum, the meshes numbering about seven across the diameter and measuring about 12 μ in width. At the angles of the meshes the bounding ridges project as short and rounded protuberances. On the triangular faces of the spore the ridges are lower than on the convex face; they sometimes form an incomplete reticulum but are usually vermicular and unconnected.

Although a strong superficial resemblance exists between *R. hirta* and *R. arvensis* it is not difficult to distinguish them. The cilia of *R. hirta* afford the most striking difference, the thallus of *R. arvensis* being usually smooth throughout. European writers, however, have shown that cilia occur exceptionally in species which are usually smooth and that they are sometimes absent in species which are usually ciliate. It is therefore unwise to emphasize too strongly a difference derived from the presence or absence of cilia alone. Fortunately *R. arvensis* and *R. hirta* show other differences of a more trustworthy character. In *R. arvensis,* for example, the upper surface of the thallus bears a broad median groove, while in *R. hirta* it usually bears a narrow sulcus only. *R. arvensis* is further distinguished by its slightly smaller spores, reticulate on all four faces; in *R. hirta* the reticulum is usually distinct on the convex face only. In *R. trichocarpa,* according to Howe, the spores are more opaque and slightly larger than in *R. hirta,* the margins of the thallus are rounded rather than acute, and the cilia are much more numerous and longer, attaining a length of 0.3–0.65 mm.

5. Riccia Lescuriana Aust., Proc. Acad. Philadelphia for 1869: 232. *R. glaucescens* Carringt., Grevillea **8**: 41. 1879. On moist black earth in paths among rocks, in company with *R. Austini* and *R. sorocarpa*. West Rock Ridge, New Haven, Connecticut (*G. E. Nichols*, 1911). New to New England. The original material of *R. Lescuriana* was collected by Austin near Closter, New Jersey, and distributed in Hep. Bor.-Amer. *143*. The species has since been recorded from Jacksonville, Florida (*J. D. Smith*), from Fort Ross, California (*M. A. Howe*), and from Illinois (on the authority of Austin). In 1898 Heeg[1] reported its occurrence in Europe, citing specimens from numerous localities, and reduced *R. glaucescens* to synonymy.

In its most typical condition *R. Lescuriana* forms rosettes 1.5–2 cm. in diameter, but the plants more frequently grow irregularly scattered or in indefinite mats. Their color is green when fresh with a somewhat glaucous cast, much less marked, however, than in *R. Austini* and *R. sorocarpa*. As the plants grow older they sometimes become more or less tinged with yellow. The margin is often the same color as the rest of the upper surface but is occasionally pigmented with purple, and purple spots usually appear over the capsules as they approach maturity. The thallus forks from one to four times, the branches measuring 2–3 mm. in width and about 3 mm. in length. The terminal branches are rounded or bluntly pointed at the apex; on the upper surface they show a shallow median groove about one third the width of the thallus, bounded on each side by a rounded ridge. The groove is usually about a millimeter in length; at its apical end it becomes abruptly obliterated through the convergence of the lateral ridges; toward its basal end it gradually becomes flattened out, leaving the older portions of the thallus plane or nearly so. The ventral scales do not extend beyond the margin; they are commonly hyaline and inconspicuous but sometimes show a purple pigmentation. Near the margin of the thallus several series of cilia can often be demonstrated. They average about 0.15 mm. in length and are usually bluntly pointed. According to Heeg these cilia are short-lived and are sometimes scanty or absent altogether. In the West Rock specimens they are very well developed, and their presence is emphasized by Austin in his original description. He even describes two varieties, *cruciata* and *trichotoma*, based largely on differences in the

[1] Bot. Not. 1898: 111.

length of the cilia. In cross section a convex median region becomes apparent on the lower surface of the thallus, the sides rising obliquely and meeting the upper surface at an angle of 90 degrees or somewhat less. The thickness of the thallus is from one third to one half as great as the width. The epidermal cells are thin-walled and hyaline, the shape varying from broadly ellipsoidal to pyriform. They soon collapse and disappear, but the cells of the next layer then become hyaline also and apparently act as an epidermis.

The inflorescence is monoicous but the capsules are not always abundant. The spores are brown and average about 100 μ in diameter. The convex face develops a regular reticulum with about eight meshes across the diameter, the individual meshes measuring about 12 μ in width. The ridges bounding the meshes are very low but sometimes project slightly at the angles as truncate or rounded papillae. Between the convex face and the three plane faces a narrow hyaline wing, 2–10 μ wide, is formed, the margin of which is minutely and irregularly crenulate. The plane faces are marked with still lower ridges than the convex face; in most cases they scarcely anastomose, but sometimes a more definite reticulum is formed.

Lindberg [1] referred *R. Lescuriana* as a synonym to *R. Michelii* Raddi, a species of southern Europe, which has since been described in detail and figured by Levier.[2] The two species are, indeed, very closely related, and Müller [3] emphasizes the fact that the ciliate form of *R. Lescuriana* can be distinguished from *R. Michelii* only with difficulty. Apparently the median groove extends farther backward in *R. Michelii* than in *R. Lescuriana*, and the epidermal cells are rarely or never pyriform. The most important difference between the two species, however, is in the inflorescence, *R. Michelii* being dioicous and *R. Lescuriana* monoicous. Among the species of the eastern United States *R. arvensis* bears some resemblance to *R. Lescuriana* and agrees with it in having a broad median groove on the upper surface of the thallus. But *R. arvensis* is a smaller plant, more glaucous in appearance, and its spores are smaller and more regularly reticulated on the plane faces.

6. Nardia scalaris (Schrad.) S. F. Gray, Nat. Arr. British Pl. **1**: 694. 1821. *Jungermannia scalaris* Schrad., Syst. Samml. Krypt.

[1] Musc. Scand. 2. 1879.
[2] Bull. de l'Herb. Boissier **2**: 229–240. *pl. 5.* 1894.
[3] Rabenhorst's Kryptogamen-Flora **6**: 176. 1907.

Gewächse **2**: 4. 1797. *Mesophylla scalaris* Dumort., Comm. Bot. 112. 1822. *Alicularia scalaris* Corda; Opiz, Beitr. zur Naturk. **1**: 652. 1829. On rocks. Eastport, Maine (*A. W. E.*, 1911). New to New England. Although *Nardia scalaris* is so abundant in northern Europe, only a few records of its occurrence in North America have been published. The writer is now able to cite the following localities for the species, several of which have already been noted elsewhere:[1] Greenland, according to C. Jensen; Battle Harbor, Labrador, and Lantern Cove, Newfoundland (*Waghorne*); Arichat, Cape Breton, Nova Scotia (*O. D. Allen*); Campobello Island, New Brunswick (*Farlow*); Dawson, Yukon (*Williams*); Yes Bay, Alaska (*Howell*); Juneau, Alaska (*Brewer* and *Coe*); Nanaimo, British Columbia (*J. Macoun*); Port Renfrew, British Columbia (*Miss Gibbs*); Mt. Ranier, Washington (*O. D. Allen, Foster, Flett*); Olympic Mountains, Washington (*Frye*). The specimens from Nova Scotia and New Brunswick grew on low cliffs by the sea, and those from Eastport were collected in a similar habitat. The plants formed dense mats, scarcely ten feet above high water mark and only a few feet below the edge of the woods.

The species is dioicous and most of the material from North America is completely sterile. The shoots are normally prostrate but become suberect when growing in compact masses. On account of their rotund undivided leaves, usually imbricated and concave, the plants bear a considerable resemblance to such species as *N. crenulata* and *Jungermannia sphaerocarpa*. They can be at once distinguished, however, by their small but persistent underleaves, which are lanceolate or subulate in form and taper out to slender points. These underleaves show clearly, even when a shoot is viewed from one side, because they are not closely appressed to the stem but spread out from it at the base almost at right angles. The leaf-cells have small but distinct trigones and each encloses a small number of large and glistening oil-bodies with a smooth surface. These peculiarities will also assist in distinguishing the species.

The closest relative of *N. scalaris* is *N. Geoscyphus* (DeNot.) Lindb., known in New England from New Hampshire and Massachusetts.[2] This species being paroicous is frequently fertile. The plants rarely occur in dense mats, so that the shoots are usually prostrate and

[1] See especially Macoun, Cat. Canadian Pl. **7**: 12. 1902.
[2] See Evans, Rhodora **9**: 57. 1907.

closely adherent to the soil. The leaves, although sometimes undivided, are often bifid, and in the variety *insecta* most of the leaves show the bifid character. The underleaves, although present, are often short-lived and difficult to demonstrate. The trigones in the leaf-cells are usually smaller than in *N. scalaris* and the oil-bodies are less conspicuous on account of their granular surface. Unfortunately in both species the oil-bodies lose their peculiarities in old material, and sometimes disappear completely from specimens which have been long preserved.

7. **Odontoschisma elongatum** (Lindb.) sp. nov. *O. denudatum*, var. *elongatum* Lindb., Not. Soc. F. et Fl. Fenn. **13**: 361. 1874. In bogs on the margins of ponds. Maine: Upper Wilson Pond, near Greenville, Maine (*A. W. E.*, 1911). New Hampshire: Lower Greeley Pond, Waterville (*Miss Lorenz,* 1908). Specimens from Scoresby Sound, Greenland, collected by N. Hartz in 1892 and listed by C. Jensen [1] as *O. denudatum,* also belong here. The species likewise occurs mixed with the type material of *O. Macounii,* collected in 1869 by Macoun in the Lake Superior region of Ontario. Lindberg's variety *elongatum* was based on a series of specimens from Iceland, Lapland, and Finland. Among these was one collected by Ångström at Lycksele in Lapland and distributed by Gottsche and Rabenhorst, under the name *Sphagnoecetis communis,* in their Hep. Europ. *440.* This specimen, which agrees fully with the American specimens noted above, may be considered the type of *O. elongatum.* According to published records the species grows also in northern Germany,[2] in the Faroe Islands,[3] in Scotland,[4] and in Austria.[5] One of the Austrian specimens cited was collected by Breidler near Mittendorf in Styria and distributed in Flora Exsic. Austro-Hungarica *2340.* Unfortunately this plant (of which the writer owes an example to the kindness of Miss Haynes) does not agree with Lindberg's type and should not be included under *O. elongatum.* The other Austrian specimens reported should therefore be further investigated.

Although *O. elongatum* sometimes grows mixed with *Sphagnum* and other bryophytes, it often forms large mats which are free from admixture. The type specimen is associated with *Lophozia inflata*

[1] Meddel. om Grønland 15: 369. 1898.
[2] Warnstorf, Kryptogamenfl. der Mark Brandenburg **1**: 238. 1902.
[3] C. Jensen, Bot. of Færöes **1**: 125. 1901.
[4] Macvicar, Jour. Bot. **43**: 118. 1905.
[5] Breidler, Mitt. Naturw. Ver. Steiermark **30**: 335. 1894.

(Huds.) M. A. Howe, and it is interesting to note that the same species occurs in connection with the material from New Hampshire. The color of *O. elongatum* is sometimes a bright green, but a yellowish or brownish pigmentation is usually present and a deep blackish purple hue is not uncommon. The shoots at first produce branches very sparingly, and the long unbranched ascending axes are a striking feature of the species. As the stems become prostrate with their increase in length, branches of the usual intercalary kind are produced, some lateral in position and some ventral. Among the latter, as in other members of the genus, a few show a flagelliform character and grow downward, holding the plant firmly in place. Except on these specialized branches rhizoids are sparingly developed.

The orbicular leaves, which usually measure 0.5–0.7 mm. in diameter, are sometimes distant but more frequently contiguous or imbricated. In most cases they are distinctly concave. The leaf-cells average about 20 μ along the margin and about 23 μ in the median and basal portions of the leaf. The marginal cells sometimes form an indistinct border, but the texture of the leaves is usually uniform throughout. When the trigones are well developed they are orbicular and project into the cell-cavities; when poorly developed they may be triangular with concave sides.

Lindberg considered his variety *elongatum* poorly supplied with underleaves, but they are really better developed than in most species of *Odontoschisma* and often acquire a size of 0.2 × 0.15 mm. They are not very definite in outline but tend to be ovate from a broad base. In some cases they may be shortly bidentate at the apex but this condition is far from constant; occasionally an indistinct lateral tooth is present. Slime papillae are unusually abundant; they occur not only along the margin but also on the surfaces, being especially numerous on the upper or inner surface. The writer [1] has already called attention to the constant presence of underleaves in *Odontoschisma* and has emphasized the fact that they yield specific characters of importance. Unfortunately, on account of their fragility, they are often overlooked. A clear idea of them can be readily obtained by dissecting off the tip of a vigorous shoot, mounting it in the usual way, and then crushing it by a gentle rubbing pressure on the cover-glass. In this way the underleaves can be separated from the other parts and examined by themselves. Since

[1] Bot. Gaz. **36**: 330. 1903.

they acquire their characteristics while still close to the growing point, the underleaves secured in this way will give a better idea of their true structure than the weathered underleaves dissected from the older parts of a shoot.

The male plants of *O. elongatum* have not yet been observed, but the inflorescence is evidently dioicous. The female branches are sometimes ventral and sometimes lateral. They are usually very short but are occasionally somewhat elongated. Their leaves, however, are always more or less modified. The bracts proper are in two or three pairs. Those next the perianth, which are of course the most characteristic, are typically ovate and bifid for one third to one half their length, showing a narrow sinus and acute lobes. Their margins are irregularly crenate or dentate, and sometimes one or two basal lobes or divisions are present. The corresponding bracteole is much like the bracts, except that its divisions are blunter and less definite. Deviations from these typical conditions are not infrequent, the lobes of the bracts being sometimes short and blunt and the bracteole sometimes showing little or no indication of an apical sinus. The tendency to vary in this way becomes even more apparent in the other bracts and bracteoles, several of which may be quite undivided at the apex. Unfortunately mature perianths of *O. elongatum* are still unknown. In the very immature perianths found in unfertilized flowers the mouth is slightly and irregularly lobed and the margin is finely crenulate from projecting cells. These peculiarities doubtless persist until maturity.

Gemmae are comparatively rare in the present species, and many tufts fail to show them altogether. The gemmiparous shoots are suberect and much resemble those of *O. denudatum*, except that they are usually shorter, the development of the gemmae leading more rapidly to the limitation of their growth. In most cases the transition between normal leaves and gemmiparous leaves is very abrupt, but it is sometimes more gradual and a few cases have been observed in which a shoot recovered from the tendency to form gemmae and developed new normal leaves. The gemmae themselves, which measure about 25 $\times$ 33 μ, are oval, two-celled bodies with delicate walls.

One of the closest allies of *O. elongatum* is *O. Macounii* (Aust.) Underw., and it is possible that Austin did not distinguish clearly between them when he published his description of the latter plant.

In commenting upon the type-material of this species the writer[1] called attention to the fact that it consisted of an admixture composed of a pale plant with gemmae and a more or less pigmented plant without gemmae. It was recommended that the pale material, from which the original description was evidently largely drawn, should be considered the actual type of the species. With regard to the pigmented material judgment was withheld, although the possibility was suggested that it might perhaps represent a divergent form of *O. Macounii*. It now appears, as noted above, that this pigmented material represents *O. elongatum*. The species agrees with *O. Macounii* in its concave leaves and relatively large underleaves. Its leaves, however, are less densely imbricated, the leaf-cells have smaller trigones, the slime papillae on the surface of the underleaves are more numerous, the gemmiparous shoots are shorter, their leaves are smaller, and the gemmae themselves have thinner walls. In *O. denudatum*, which also is closely related, the plants are somewhat more robust than in *O. elongatum*, and the plants are frequently pigmented with reddish, a type of coloration which the new species apparently never shows. *O. denudatum* is further distinguished by its smaller underleaves (on shoots with normal leaves), by the absence of surface papillae, and by the more acuminate divisions of the perichaetial bracts. The leaf-cells are much the same in the two species, and the similarity in the gemmiparous shoots has already been mentioned.

8. Anthoceros crispulus (Mont.) Douin, Rev. Bryol. **32**: 27. *f. 1–15.* 1905. *A. punctatus, β. multifidus* Nees, Naturgeschichte der europ. Lebermoose **4**: 340. 1838. *A. punctatus, α. crispulus* Mont.; Webb & Berthelot, Hist. Ins. Canar. Bot. **2**^{4}: 64. 1840. On moist earth along roadsides. Andover and West Hartford, Connecticut (*Miss Lorenz*, 1911). Not before recorded from North America. Although *A. crispulus* was included by Nees von Esenbeck among the varieties of *A. punctatus* L., he recognized some of its most important characteristics and intimated that it might perhaps represent a distinct species. Douin, however, was apparently the first one to raise it definitely to specific rank. His description and figures were drawn from specimens collected in the department of Eure-et-Loir, in France, and the species has since been reported by C. Müller[2] from various scattered localities in Germany. It will probably be found

[1] Bot. Gaz. **36**: 321. 1903.
[2] Beih. zum Bot. Centralbl. **22**^{2}: 253. 1907.

to have a wide distribution in Europe. In addition to the synonyms quoted above Douin gives *Anthoceros multifidus* L., Sp. Plant. 1140. 1753. If this were actually the same plant the species should of course bear the Linnaean name. *A. multifidus*, however, was based upon a non-binomial species of Dillenius, which Lindberg,[1] after examining the type in the Dillenian herbarium, pronounced the same as *Riccardia multifida* (L.) S. F. Gray (*Jungermannia multifida* L.). *A. multifidus*, therefore, becomes reduced to synonymy and the name is not available for future use. The type specimen of Montagne's variety was collected in the Canary Islands, and Douin does not state whether or not he had examined it personally.

The differences between *A. punctatus* and *A. crispulus* are brought out very clearly by Douin, and the following notes are drawn entirely from his paper. Both the thallus and the capsule yield differential characters. In *A. punctatus* the thallus is only slightly lobed; in *A. crispulus* the lobing is much more extensive, the lobes arising from the surface of the thallus as well as from the margin, thus giving it a strongly crispate appearance. In *A. punctatus* the capsule is from thirty to forty times as long as wide at the time of dehiscence; in *A. crispulus* it attains a length of from fifty to seventy times the width. In *A. punctatus* the pseudo-elaters are usually only one or two cells long and apparently never exceed a length of three cells; in *A. crispulus*, although short pseudo-elaters occur in abundance, much longer ones are also present, some of them being from four to nine cells in length. Both species bear dark colored spores, roughened, especially on the convex face, by numerous sharp or furcate papillae.

The additions to local state floras, not already mentioned, are as follows:—

For Maine. *Bazzania tricrenata*; Greenville (*A. W. E.*). *Calypogeia Neesiana*; Upper Wilson Pond, near Greenville (*A. W. E.*). *Lejeunea cavifolia*; Greenville (*A. W. E.*). *Lophozia excisa*; Lubec (*A. W. E.*). *Radula tenax* and *Sphenolobus exsectus*; Greenville (*A. W. E.*).

For New Hampshire. *Calypogeia Neesiana*; Waterville (*Miss Lorenz*). *Cephalozia connivens*; Waterville (*A. W. E.*). *Cephaloziella Hampeana*; various localities in the White Mountains (*W. G. Farlow, Miss Lorenz, A. W. E.*)[2] *Leucolejeunea clypeata*; opposite Brattle-

[1] Krit. Gransk. 37. 1883.

[2] The determinations of the *Cephaloziellae* in this list were mostly made or confirmed by Professor Douin, of Chartres.

boro (*J. W. Russell*, 1844), specimen communicated by L. W. Riddle.

For Vermont. *Metzgeria pubescens* and *Riccardia palmata*; Jamaica (*F. Dobbin*). *Cephaloziella Hampeana*; Jerico (*A. W. E.*). *C. myriantha*; Killington Peak (*E. H. Lorenz*).[1] *Porella rivularis*; Jamaica (*F. Dobbin*). *Radula obconica*; Salisbury (*Miss Lorenz*).

For Massachusetts. *Calypogeia Neesiana*; Reading (*C. C. Kingman*). *Cephalozia serriflora*; West Harwich (*C. A. Weatherby*).[2] *Cephaloziella Hampeana*; Nahant (*W. G. Farlow*). *Lophozia porphyroleuca*; Mt. Greylock, Adams (*A. LeR. Andrews*).

For Rhode Island. *Calypogeia tenuis* and *Cephaloziella elachista*; Hopkinton (*A. W. E.*). *C. myriantha*; Wickford (*A. W. E.*). *Lepidozia sylvatica*; Westerly and Hopkinton (*A. W. E.*). *Lophozia excisa*; Hopkinton (*A. W. E.*). It should also be noted that the Rhode Island records from *Riccardia pinguis and Cephalozia lunulaefolia* may now be marked with the sign "+," the necessary specimens having been collected by the writer.

For Connecticut. *Calypogeia Neesiana*; Ledyard and Stonington (*A. W. E.*). *Lophozia alpestris* and *Sphenolobus Hellerianus*; Salisbury (*A. W. E.*).

The census of New England Hepaticae now stands as follows: Total number of species recorded, 169; number recorded from Maine, 116; from New Hampshire, 128; from Vermont, 103; from Massachusetts, 90; from Rhode Island, 71; from Connecticut, 128; common to all six states, 47.

YALE UNIVERSITY.

NOTES ON THE FLORA OF DUXBURY, MASSACHUSETTS.

CLARENCE H. KNOWLTON.

THE Committee which is working on the Flora of the Boston District has had very little information from the southern, and especially the southeastern towns. Except for the Blue Hills and the high land in Sharon and vicinity, this section of country is very flat, rising from sea-level in the east to a height of about 300 feet in Belling-

[1] See Grout, Bryologist **14**: 53. 1911.

[2] Miss Greenwood reports this species from Worcester (Bryologist **13**: 8. 1910), but her record was based on specimens which the writer would refer to *C. lunulaefolia*.

ham, Medway and Holliston, where it merges into the central Massachusetts plateau. It is a region of obstructed drainage and sluggish streams, with many ponds, and the waters find their way gradually into the North River, the Taunton and the Charles, which flow east, south and north respectively. The low hills and ridges are naturally covered with oak or pine. Some of the ridges are fertile and productive, but agriculture seems to find its best land in the meadows. The real interests of the people are in the manufacturing of the larger towns. The people merely occupy the country, without doing overmuch to develop it.

Thousands of acres are in the broad sand-plains so typical of the section. These and the low glacial knolls are covered with the inevitable *Andropogon scoparius* and *Betula populifolia.* The meadows seem to be low-lying sand-plains, containing much humus, but little or no clay, and the swamps and ponds are underlaid by water-washed sand and gravel of glacial origin. The swamps are occupied by *Acer rubrum* or *Chamaecyparis thyoides,* but many of them, and some of the wetter meadows and shallow ponds have been made over into cranberry bogs.

The eastern portion of this sand-plain country, comprising the northern half of Plymouth County, has been very little known botanically. It is especially interesting from its proximity to the sea, and because it runs into the big terminal moraine which begins in Kingston and Plymouth. I have made several trips of exploration to Hanson, Halifax and Pembroke, which lie just back from the coast, in this corner of our district, but outside of a few characteristic plants like *Solidago Elliottii, S. tenuifolia, Leucothoe racemosa, Ilex opaca, I. glabra, Woodwardia areolata* and *Aspidium simulatum,* the sand-plains and swamps might have been in the Merrimac valley, around Lowell, Tewksbury or Chelmsford, 45 miles further north. When I came to explore Duxbury I expected to find much the same flora, plus the halophytes and xerophytes of salt marsh and sea-beach. In general I found this to be true, for most of the species mentioned above seem to flourish there, but I found in addition enough other plants of interest to warrant this publication.

Along the seashore grew some 35 maritime species. Among these may be noted *Salicornia ambigua* growing freely with *S. europaea, S. mucronata, Atriplex arenaria, Suaeda linearis* and *S. maritima. Xanthium echinatum* flourished on the shore edge of the salt-marsh,

and *Hierochloe odorata* and *Phragmites communis* were abundant here as elsewhere along the South Shore.

It was of special interest to find some of these seashore plants extending inland. *Prunus maritima* fruited heavily this year in the gravelly soil it likes best. It extends inland to Halifax and Hanson, some ten miles, and is equally abundant in the Merrimac valley, 35 miles from the sea. *Lechea maritima* has an even broader landward range, as I have observed it. *Atriplex patula* grew lustily on the Duxbury dump, two miles back from the coast, with numerous garden escapes. *Salsola Kali* flourished in a barnyard, as vigorous as its var. *tenuifolia*, but still rigid and prickly. *Hudsonia tomentosa*, *Ammophila arenaria* and *Artemisia caudata* also occurred away from the shore.

As might be expected in one of the oldest Pilgrim settlements, I found many introduced plants, over 50 species. Most interesting of these was the English oak, *Quercus Robur* L. It has been set out for shade and ornament at Powder Point and elsewhere in the village, but at South Duxbury it has become thoroughly established and is rapidly spreading. In the triangle of wild land between the railroad and the old graveyard where Myles Standish lies buried I discovered a large number of these trees, of all sizes, with much fruit. So far as I know this tree has never become established elsewhere in America. It may be distinguished by its rosettes of round-lobed, crinkly-edged leaves, and its large pedicellate fruit, the acorn five times the height of the cup. Another very conspicuous introduced plant, from the West, *Oxybaphus nyctagineus*, was abundant and widely scattered over the settled part of the town. Other pilgrims from abroad were *Artemisia Stelleriana*, *Populus alba*, *Berteroa incana*, and *Dianthus plumarius*. There were but a few plants of the last growing in a railroad cut very near the John Alden house.

I observed exactly 50 species of *Gramineae*, a few of which deserve mention. *Sporobolus asper* was in perfect condition on Sept. 24, the dark spikelets fully developed, and well emerged from the upper sheath. *Paspalum setaceum* was easily distinguishable from *P. Muhlenbergii* by its hairy sheaths and bright blue-green foliage. I have also found these two at Halifax, Plymouth and West Barnstable. *Aristida purpurascens* and *Calamagrostis cinnoides* I found each at one place only. *Andropogon glomeratus* was abundant in a wet meadow. *Agrostis perennans* here, as elsewhere, was a characteristic plant of the dry oak woods.

My visits to Duxbury have been late for *Carex*, but on Sept. 10, in a cleared *Chamaecyparis* swamp, I found *Carex trisperma*, var. *Billingsii*, and splendid fresh green plants of *C. bullata*, var. *Greenii*, growing in sphagnum moss. I have noticed seven other common species in the township. Along the mucky shore of Cranberry Pond grew a form of *Scirpus cyperinus*, with cylindrical spikelets, 8 mm. long, which proved to be var. *Andrewsii*. The type is abundant.

The "South Shore," so-called, including the coast towns from Boston to Plymouth, is a veritable paradise for shrubs and woody vines. The numerous forms of *Vaccinium corymbosum*, *Cephalanthus occidentalis* in all shapes and sizes, *Rhododendron viscosum*, *Clethra alnifolia*, *Ilex verticillata*, *I. glabra* and *I. laevigata*, and *Nemopanthus fascicularis* are typical shrubs of the swampy woods, and were all flourishing in Duxbury. *Ilex opaca* I have not yet found, but as it is frequent in near-by towns, and ranges as far southeast as Sandwich on Cape Cod, it is to be expected almost anywhere in moist woods.[1] *Leucothoe racemosa* is also a well-distributed shrub in the region, and I found a little of it in Duxbury. *Psedera quinquefolia*, *Smilax rotundifolia* and *S. glauca* were frequent, the last species in the open, in dryer soil than its congener. The only alder was *Alnus rugosa*, the only grape *Vitis Labrusca*. *Rhus* was well represented by *R. typhina*, *R. glabra*, *R. copallina*, *R. Vernix* and *R. Toxicodendron* (the creeping form).

Solidago Elliottii grew very abundantly in swamps and moist soil generally, and it is a typical plant of the region. In many ways it is our handsomest species, its large dark green foliage forming a pleasing contrast to the clear yellow flowers. I found a little of *S. tenuifolia*, and a great deal of *S. odora*, already past blooming on Sept. 10. *Aster spectabilis* grew well in dry gravelly woods, but *A. laevis* seemed to be absolutely missing from the flora. *Hieracium Gronovii* was frequent in dry soil, *H. venosum* with green leaves was common, but I only found one plant of *H. canadense* and none of the other species.

Asclepias amplexicaule occurred here and there on the sand-plains in some abundance. One sterile shoot I collected because it bore three whorls of three leaves each. *Galium pilosum*, *Gentiana crinita*, *Polygonella articulata* and *Polygonum arifolium* deserve passing mention.

[1] As the Pilgrims found "holly" on their first exploring trip from Provincetown, in November, 1620, it is reasonable to suppose that this tree had a wider range on Cape Cod, originally.

Last, and in size surely least, was *Lemma perpusilla,* which covered the surface of a small and treacherous kettle-hole pond in a pasture. This species is credited to "Massachusetts (Clark)" without further data, in Thompson's monograph on Lemnaceae. There are no other records given from New England. The indefinite printed record is thus confirmed and made definite, and a new species added to the Local Flora list. Prof. M. L. Fernald collected specimens of this plant in Barrington, R. I., May 30, 1911, on the New England Botanical Club Field Day, thus adding a new species to the Rhode Island Flora.

In closing it may be well to call attention to the conspicuous lack of native *Leguminosae.* Aside from *Lathyrus maritimus,* the only species I noticed were *Baptisia tinctoria, Lespedeza Nuttallii, L. hirta* and *L. capitata.*

In general, the flora of Duxbury is that of seashore and sand-plain, with oak and pine woods, red maple and *Chamaecyparis* swamps. There are many wanderers northward from Plymouth and Cape Cod, but yet the flora is decidedly different from that of the morainal region and warmer shores only a few miles south.

Hingham, Massachusetts.

A Second Station for Cyperus Grayii in Essex County, Massachusetts.— When the Committee on the Local Flora reported in February, 1911, upon the occurrence of *Cyperus* in the Boston District, *C. Grayii* was known within the area only from Plum Island and "never reported at any other station north of Plymouth." It may therefore interest students of our local flora to know that the species occurs upon the sand dunes at Ipswich. While crossing the dunes with a party of students upon October 12th, I found a single small colony of not more than half a dozen plants. They had all fruited well and most of the achenes had fallen, so that the colony (presumably of recent derivation from Plum Island) is likely to increase. A specimen was taken for the Club Herbarium and another was collected by Mr. Harold St. John.— M. L. Fernald, Gray Herbarium.

Regarding Viola pedata, forma rosea.— Miss Sanders's report of this plant from Wayland, Mass. (Rhodora, xiii. 172) leads me to

state my experiences with it. Occasionally during several years past I have found on a sandplain in Framingham where the bird's-foot violet occurs in great abundance plants bearing flowers varying in color from a light to a deep magenta, or almost red. Though the position of these individuals was carefully noted, I have never been able to find flowers of the same color in the same spot the succeeding season. Finally two of the unusual plants were transplanted to a garden. A year later these very plants bore the usual lilac-purple flowers. The cause of my inability to rediscover these reddish flowers at their old stations was thus suggested, and I uprooted the fickle things.

A similar experience befell me with *Rudbeckia hirta.* In July 1910 a specimen of this handsome weed was noticed differing from the thousands of others about it on a dry hillside in that the proximal half of each ray was a deep brownish-purple, somewhat brighter than the disk. It was carefully transplanted to good garden soil. But prosperity ruined it, too; this summer's flowers were plebeian in every way. Hence it suffered the fate of the violets.

It seems, therefore, that in these two cases, weak or pathological conditions are responsible for the color forms, the death or recovery of the abnormal individuals making their rediscovery impossible.— A. J. Eames, Cambridge, Massachusetts.

Sclerolepis uniflora in Massachusetts.— On the 29th of October, 1909, Messrs. J. F. Collins, Thomas Hope and H. W. Preston found the unique little pine barren Composite, *Sclerolepis,* on the shores of Wallum Pond in Burrillville, Rhode Island,[1] the only station in New England except Dr. Lewis's at Bradford, New Hampshire.[2] Having occasion recently to look up the location of Wallum Pond, the writer was interested to note that it lies partly within the town of Douglas in Worcester County, Massachusetts; and since the Committee on the Massachusetts Flora had no record of *Sclerolepis* from the state it seemed worth while to settle whether the plant is as localized (found only in Rhode Island) as might be inferred from Professor Collins's note. Accordingly plans were made to visit the pond with Mr. F. F. Forbes on October 29 last — on which date in 1909 the

[1] Collins, Rhodora, xii. 13 (1910).
[2] F. T. Lewis, Rhodora, vii. 186 (1905).

plant was "just coming into bloom." We had expected to go from Brookline to Douglas by automobile, but the freezing weather of the preceding night rendered a motor trip somewhat unattractive, so we went by train and drove from the station in Douglas to the northern end of the pond. All the vegetation of the sandy beach was blackened by frost, but searching on our hands and knees among the shriveled remnants of *Rhexia*, *Ilysanthes*, etc. we soon found a dried and fruiting plant of *Sclerolepis* within a stone's throw of the northern end of the pond — about one mile north of the Rhode Island line. Prolonged search revealed no more of the plant on the dry beach, but after giving up the hunt and starting upon a circuit of the pond we were delighted to find *Sclerolepis* green and in all stages of development from young bud to mature fruit in a spring-rill (also in Massachusetts) upon the northeastern shore. After that little of the plant was found upon the eastern shore, but on making our way over and amongst the granitic boulders which strew the western shore we came upon it in great quantity at every spring and seepy bank among the boulders. Such stations, with *Sclerolepis* the only green and flowering plant at this late date, were found at frequent intervals along the entire length of the western shore, in both Rhode Island and Massachusetts. The point which struck us was that, although abundant in and around springs and often completely submersed, *Sclerolepis* was nowhere seen in rapidly flowing streams.

The abundance of the plant about Wallum Pond, which is a clear sheet of water with a clean beach of granitic gravel and sand, suggests the probability that search about other such ponds — which are numerous — in Worcester County and the eastern section of Massachusetts as well as in eastern Connecticut, will show *Sclerolepis* to be more generally distributed than we know. It is highly probable that the late flowering season of the plant — after most plants of such shores are past maturity — has prevented its detection, but from our experience at Wallum Pond we should advise watching for the plant in September and early October. Superficially *Sclerolepis* suggests the Mare's Tail, *Hippuris vulgaris*, or a very attenuated *Aster nemoralis* with tiny flesh-colored heads.— M. L. Fernald.

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THE POND FLORA OF CAPE COD.

Edmund W. Sinnott.

The flora of Cape Cod presents many features of interest to the botanist, for it includes scores of plants which are unknown or rare on the rest of the mainland of Massachusetts and which find their best development on the sandy soil of the coastal plain. Botanizing anywhere on the peninsula is consequently attended, at least to the new-comer, by the formation of many new acquaintances among the plants of the beaches, the salt-marshes, the barrens and the swamps, which have each their distinct vegetation and their particular interest.

Perhaps the most fascinating collecting-ground for the field botanist, however, is furnished by the hundreds of ponds scattered everywhere over the Cape. These range in size from the tiny sloughs in every hollow to such large lakes as Wakeby Pond in Mashpee, Nine-Mile Pond in Barnstable and Pleasant Lake and Long Pond in Harwich. It is in the waters and along the shores of these ponds that are found many of the characteristic coastal-plain plants which here reach their northern limit in the United States. During the past five summers the writer has been fortunate enough to visit nearly all the large ponds on Cape Cod and many of the smaller ones in almost every town of Barnstable County. The object of the present paper is to record certain observations as to the general character of the pond vegetation and as to the distribution of the various plants of which it is composed.

The ponds of Cape Cod fall naturally into two main groups: those which are well drained and have practically the same level throughout the year, and which include all mill-ponds, herring-ponds and others

from which streams are continuously flowing; and those which have poor drainage or none at all. To the latter group belong the great majority of the small ponds as well as most of the larger ones.

The vegetation along the shores of the well-drained ponds is not distinctive and is very much like that found in similar situations throughout southeastern New England, save that it is somewhat less luxuriant. Wide sandy shores are, of course, absent. Where the bottom shelves off deeply and the banks are at all precipitous, the pine and oak flora of the barrens comes down to the water's edge and the sandy or pebbly bottom near the shore will support only such plants as *Nymphoides lacunosum, Lobelia Dortmanna* and *Scirpus americanus*. In the majority of cases, however, the slope of the shore-line is much more gradual, and allows the accumulation of a considerable deposit of mud and silt, which forms a congenial habitat for a large group of plants, of which *Pontederia cordata* and *Decodon verticellatus* are perhaps the most characteristic. These are found along the shores of all ponds whose water-level is approximately stable, and with them are such familiar things as *Typha latifolia, T. angustifolia, Sparganium americanum* var. *androcladum, Sagittaria latifolia, Scirpus validus, Acorus Calamus, Impatiens biflora, Ludvigia palustris, Asclepias incarnata* var. *pulchra, Bidens connata* and very many others, which form the dense and (for the Cape) luxuriant vegetation of such pond-shores. In the water flourish *Castalia odorata, Nymphaea advena, Myriophyllum humile,* various species of *Potamogeton,* notably *P. Robbinsii,* and other equally familiar plants. This general group of mud-loving things, particularly *Sparganium americanum* var. *androcladum* and *Sagittaria latifolia* are also characteristic of cranberry-bog ditches and sloughs wherever alluvial mud has been deposited. This whole mud flora is practically identical with that of similar situations throughout southeastern New England but comprises a very different group of plants from those growing on the peaty mud of the undrained ponds in the sand-barrens.

The ponds where drainage is incomplete or absent constitute the great majority of all the bodies of water on Cape Cod, and have associated with them a large and distinctive flora. The water-level here is subject to great fluctuations, and the surrounding dry-ground vegetation is consequently forced to stop at the extreme high-water mark, with the result that in the summer months, when all the ponds are apt to be rather low, a sandy beach extends for some distance upwards

from the water's edge. In ponds with absolutely no outlet, the rise and fall of the water is greatest, and the beach here is of considerable width, but in many cases the pond overflows into a drainage-brook at a little above its normal summer height and is consequently surrounded at that season by only a narrow belt of sandy shore. This is the case with most of the large lakes.

The character and extent of the vegetation on these beaches and in the shallow water at the pond-edge vary considerably from one pond to another and seem to be under the control of several different factors.

Small ponds, in general, show a much more luxuriant plant-growth around their shores than do larger ones, which are apt to have long stretches of pure sand or gravel beach and bottom, practically devoid of vegetation. This may well be explained by the fact that the wave-action, which is much more vigorous on extensive sheets of water than on smaller ones, has in these larger ponds pretty thoroughly washed out all the mud and fine material in the sand, and left it in much the condition of a barren sea-beach. It is also conceivable that in the winter and spring, when the water is usually highest and storms are most frequent, the waves should wash out and destroy seeds and young plants which had found lodgment along the shore. It is noticeable that wherever the soil next the shore has been disturbed and broken up, as by a cutting or a road, the waves have spread the sand up and down the beach for a considerable distance, to the practical exclusion of all vegetation. These same sterile sandy beaches are also occasionally found on small ponds, but in such cases a good depth of water and an abruptly sloping bottom are always observable. Wherever conditions are favorable, therefore, for washing out fine material of all kinds from the shores and depositing on the bottom, a sterile beach of pure sand and gravel will result.

Most of the smaller ponds, which are protected by their size from violent wave action, have bottoms sloping gently to no great depth and consequently both the beaches and the shallow shores are well able to support a considerable vegetation.

It is also noticeable that on the same pond such portions of the shoreline as are most exposed to the waves or which have especially steep slopes are much less thickly covered with plants than are the protected stretches, and that the coves or sheltered places always show a more luxuriant vegetation than do the open straight beaches.

This condition has had an important influence on the process of filling which has been going on since the ponds were left at the retreat of the ice-sheet. Their original shape seems in most cases to have been decidedly irregular, for every pond of any size has along its shore a number of indentations in all stages of filling, from shallow pools with thickly covered shores to peat-filled swamp-holes. These are cut off from the rest of the pond, at least in their later stages, by a barrier of sandy beach, and simply represent small arms of the original pond which from their sheltered position have filled rapidly and been constricted off from the main body of water. The tendency is always for a pond to smooth off its shores, thus approaching more and more to a roughly circular shape, and for the large, and especially the long and narrow ponds to become divided up into a number of smaller ones, each of which centers about some particularly broad and deep portion of the original.

The flora of the pond-shores is varied and, as has been said, contains many characteristic Cape Cod plants which from their distribution are worthy of note.

The upper edge of the beach is dry sand or gravel in summer and is apt to be invaded by herbaceous members of the surrounding sand-barren flora. Here *Aletris farinosa, Polygala polygama, Cassia nictitans, Linum virginianum, Chrysopsis falcata* and many other common things find a congenial habitat.

The plants of the lower parts of the beach, however, whose roots are in damp sand, form a distinct group, the members of which occur in practically no other situation. A list of the commonest and most characteristic beach plants, which would be found along almost every undrained pond of any size on Cape Cod, includes the following:—

Lycopodium inundatum var. *Bigelovii,* on damp sand and also on peaty mud.

Cyperus diandrus, universal and usually the first plant to gain a foothold on the sterile portions of the beach.

Rynchospora glomerata.

Xyris caroliniana.

Polygonum Careyi.

Hypericum virginicum and *Gratiola aurea,* extremely common everywhere and flourishing equally well on sand or mud.

Hypericum canadense.

Rhexia virginica.

Lysimachia terrestris.

Sabatia dodecandra, a beautiful flower and one of the glories of the Cape. It is apparently absent below Eastham.

Drosera filiformis, flourishing everywhere and sometimes attaining a height of 18 inches.

Drosera longifolia.

Polygala cruciata.

Stachys hyssopifolia, abundant on the upper Cape but rare beyond Brewster.

Lycopus sessilifolius.

Gerardia purpurea.

Coreopsis rosea, extremely abundant.

Solidago tenuifolia, characteristic of dry sandy soil all over the Cape, yet thriving on the damp sand of every pond-shore.

These are all very common and universally distributed, but there are many others the occurrence of which is less general or which are rare and local. Such plants are, —

Panicum Wrightianum Scribn., common on the middle Cape. This species, based upon Cuban collections of Charles Wright's, was unknown in the northern states at the date of issue of the 7th edition of Gray's Manual; but it was collected on Cape May, New Jersey, in 1909 by Mr. Witmer Stone and its discovery as a common grass on Cape Cod makes a striking addition to our "pine barren" flora. The material was determined by Mrs. Agnes Chase.

Scleria reticularis and *Fuirena squarrosa,* rare, collected by the writer only from the "Mary Dunn's" Ponds in Barnstable.

Rynchospora macrostachya, rather common.

Hemicarpha micrantha, easily overlooked but probably pretty common. It prefers pure sand.

Fimbristylis Frankii, occasional.

Eleocharis melanocarpa. On a few ponds.

Carex of several species, notably *C. lurida,* but *C. albolutescens, C. hormathodes* and others are often present.

Xyris flexuosa, rather common.

Lachnanthes tinctoria, abundant on many ponds but often lacking especially on the lower Cape.

Drosera rotundifolia, common on *Sphagnum,* patches of which are often present on well-covered shores.

Crotalaria sagittalis, local, found only on two ponds in Sandwich.

Sabatia gracilis, found by the writer only on a few ponds in the eastern part of Barnstable.

Lycopus rubellus, locally common.

Utricularia cornuta, rather frequent on sandy shores. It also appears on *Sphagnum* and occasionally on the edge of brackish marshes.

Certain members of this group of beach-plants, such as both species of *Sabatia, Drosera filiformis, Hemicarpha* and *Crotalaria* prefer a situation rather well up the beach, where the sand is not too wet, while others, such as *Rynchospora macrostachya, Gratiola, Hypericum virginicum, Lysimachia terrestris* and *Lycopodium* choose lower and damper locations, and usually appear only after a perceptible amount of fine material has accumulated. Most of the plants, however, are satisfied with almost any situation where the soil is essentially sandy and not too dry. They must of necessity be able to adapt themselves to the migrating shoreline.

The nature of the vegetation in the shallow water along the shore depends on the character of the pond and the amount of filling and of deposition of mud that has taken place. On a bottom of pure sand the first thing to make its appearance is *Nymphoides lacunosum* which usually grows in a rather narrow zone at some distance from the shore. Nearer the water's edge flourishes *Juncus militaris,* the most common and characteristic rush of the sandy ponds, and growing with it and nearly as universal is *Lobelia Dortmanna. Scirpus americanus* is always present, either scatteringly or in wide patches. These four plants prefer a sandy bottom and until sediment begins to accumulate comprise practically all the marginal vegetation. The deposition of decaying plant remains and the formation of peat accompany the filling of these ponds and the fine material is in this instance different from the more or less alluvial mud of the drained ponds and supports quite another group of plants. The most characteristic things associated with these later stages in the pond's history and which flourish only in the calm and shallow waters of the protected coves, or on their peaty shores and islands, are the following: —

Sparganium lucidum, local, and found by the writer only in Barnstable.

Sagittaria Engelmanniana, very common everywhere and showing great variety in the shape of its leaves.

S. teres, probably rather common but found by the writer only in Sandwich, Barnstable, Yarmouth and Wellfleet. In shallow water and where the bottom is sandy it has short and stout phyllodes, but more commonly they are long and tapering.

Eleocharis acicularis, on peaty shores everywhere.

E. Robbinsii, the dominant plant in very shallow, peaty ponds, gradually encroaching from the shore and finally converting the whole pond into a grassy swamp.

Cladium mariscoides, common on many ponds but often absent.

Dulichium arundinaceum, abundant and delighting in the thick vegetation along the peaty shores.

Rynchospora alba, locally common on peat.

Eriocaulon septangulare, on muddy bottoms in shallow water everywhere.

Xyris Smalliana, a striking species, usually confined to floating masses of peat, and fairly common where they are present. The writer has observed it in Barnstable, Harwich and Wellfleet.

Juncus pelocarpus, common everywhere, but exceedingly abundant on certain ponds where there is a rather pebbly bottom and not much mud. It also thrives well above the water-mark.

J. canadensis, often abundant at the water's edge.

J. marginatus, rather common.

Proserpinaca pectinata, locally common on mud.

P. palustris, rare, found only an Snake pond in Sandwich.

Myriophyllum tenellum, fairly common.

Utricularia vulgaris var. *americana*, occasional.

U. purpurea, common on muddy bottoms.

U. biflora, rare, on sandier shores.

Castalia and *Pontederia* are often present, and in the last stages of filling, when the pond has become a bog, other plants appear, which are more characteristic of the half-drained and muddy swamps. These are *Sparganium americanum* var. *androclodum*, *Sagittaria latifolia*, *Cyperus dentatus*, *Eriophorum virginicum*, *Nymphaea advena*, *Brasenia Schreberi*, *Sium cicutaefolium* and many others.

It will therefore be apparent that, as might be expected, a large percentage of the flora of the undrained sandy and peaty ponds, where conditions are very similar to those on Long Island and New Jersey, is composed of plants whose distribution is confined to the Atlantic coastal plain and its extensions.

The distribution of the pond-plants, in common with that of the rest of the flora, is influenced to a considerable extent by the topography of Cape Cod. The "backbone of the Cape" is formed by two fan-shaped terminal moraines, one of them of rather low hills running north and south along the eastern shore of Buzzard's Bay and stringing out into the Elizabeth Islands; and the other, with slightly higher elevations, which sometimes reach nearly 300 feet, extending east and west down the north shore of the main body of the Cape. East and south of these moraines, respectively, the country is mostly barren sand-plain from the soil of which practically all the fine material was washed by the waters flowing from the glacial ice-front; while on the narrow strips of land on the other side of the hills, in each case, and between them and the water, the country is much more fertile. This is particularly noticeable on the north shore of the Cape, in the northern parts of the towns of Sandwich, Barnstable, Yarmouth and Dennis, where there is considerable clay in the soil, deposited on the bottom of a dammed-up glacial lake or scooped up by the ice-sheet from the bottom of the bay. In these richer strips muddy drained ponds and alluvial swamps are conspicuous, while the typical sandy ponds, with their coastal-plain vegetation, are practically confined to the above-mentioned barrens and to the very sandy "forearm," from Chatham to Provincetown.

Although conditions are very similar throughout these sandier parts of the peninsula, the pond flora, in common with the rest of the vegetation, grows less varied as one goes eastward "down" the Cape. Of course the commonest and most characteristic plants (with one or two exceptions, such as *Stachys hyssopifolia*, which apparently does not occur below Brewster) are nearly universal in their distribution, but many of the less common things stop somewhere on the upper (western) part of the Cape. *Sabatia dodecandra*, for example, gets as far as Eastham, but the smaller species, *S. gracilis*, together with such plants as *Scleria reticularis* and *Fuirena squarrosa* reach their eastern limit on the group of small ponds near the Barnstable-Yarmouth line. *Crotolaria*, in the same way, does not come east of the town of Sandwich.

This central part of the Cape, including the towns of Sandwich, Barnstable and Yarmouth, has by far the richest pond-flora in the county. Snake, Peter's, Triangle and Spectacle Ponds, in Sandwich have wide sandy beaches and a large flora which, together with their

comparative inaccessibility, makes them a fascinating collecting-ground. Wakeby Lake (really in Mashpee) with the Cotuit Ponds and Great Nine-Mile Pond, in Barnstable, are all partially drained and have narrow gravelly beaches for the most part, which are often uninteresting, though in certain spots there is excellent collecting. Perhaps the richest flora of all, however, is found on the "Mary Dunn's" Ponds near the eastern border of Barnstable township. There are a score or more of these, of all sizes and in all stages of filling, and a number of plants grow here which the writer has found nowhere else on the Cape. In Yarmouth, also, there are many interesting collecting-places, notably Dennis, Miller, Greenough and other smaller ponds in the northern part of the town and Sandy, Basslot, Flax and others nearer the south shore. Of course the ponds of the lower Cape, such as those about Pleasant Lake in Brewster and near the villages of Eastham and Wellfleet, have a large and varied flora, as have the ponds in the Falmouth region, to the west, but many plants are rare or absent there which occur commonly in the Barnstable area.

The often sporadic and local distribution of many Cape plants would conform to what one might naturally expect of the behavior of a previously more extended coastal plain flora which is gradually dying out, and, from other evidence, it seems very possible that something like this is happening. On the other hand, the fact that vegetation both to the eastward and to the westward of the above-mentioned central region is progressively less and less rich in coastal-plain plants makes it reasonable to suppose that we have here a center of distribution for these things, which have come north not along the southern coast of Connecticut and Rhode Island, probably, for they are rare or absent there, but through Long Island, across to Martha's Vineyard and Nantucket and thence across Vineyard Sound to the mainland of Cape Cod. Their distribution here perhaps marks out roughly the position of an arm of the ancient coastal plain. The whole question is of great interest in connection with Professor Fernald's discovery of a large coastal plain flora in Nova Scotia and Newfoundland, but more data must be gathered before any very definite conclusions can be drawn in regard to the origin of the flora of Cape Cod.

The foregoing paper does not pretend to give a complete account of the pond vegetation of Cape Cod, but the writer has attempted to

enumerate merely the common and distinctive members of the pond flora, together with such of the more rare plants as have come within his experience, and to set forth certain observations as to their behavior and distribution. Much more active collecting must be done on the Cape before we can feel sure that its flora is well known, and there are few regions so near Boston which offer to the field botanist such opportunities for interesting and valuable work.

The writer wishes to express his thanks to those who have aided him in gathering data, especially to Mr. William G. Vinal, of the Providence Normal School.

Cambridge, Massachusetts.

QUERCUS IMBRICARIA MICHX. IN MASSACHUSETTS.

Geo. G. Kennedy.

Sargent in his manual of the trees of North America (1905) gives Lehigh county, Pennsylvania, as the northern limit of this species in the Eastern United States and says of it: "occasionally planted as an ornamental tree in the northern states and hardy as far north as Massachusetts"; and in the Sylva, vol. VIII, p. 177, calls it "one of the most beautiful of the American oaks, and a most distinct and desirable ornament of the parks and gardens of eastern America, where it is perfectly hardy as far north at least as the shores of Massachusetts Bay."

And yet it appears to be a rare tree in cultivation in this vicinity, two trees only being reported outside the Arnold Arboretum. One of these is near the entrance to the Chestnut Hill Reservoir, and the other close to Brush Hill Road in the town of Milton.

Prof. Sargent informs me that he has had two plantings of this species in the Arboretum: one in 1873, and one in 1887, and both from Meehan of Philadelphia. The Reservoir tree is of the 1873 planting and was sent with other oaks from the Arboretum to be set in the Boulevard adjacent to the Reservoir. There are several fine trees of the 1873 planting in the Arboretum; the best one is growing near the Motley house. This tree has a girth of 47 inches at three

feet from the ground, a height of about 45 feet and a spread of 50 feet. The Reservoir tree has a girth of 57 inches, a height of about 40 feet and a spread of 45 feet. The Milton tree has a girth of 51 inches, a height of about 40 feet and a spread of 41 feet.

These trees are apparently near enough together in size to belong to the same planting; but to account for the Milton tree being where it is, has puzzled many who recognized it as a stranger. It stands in an open pasture about two feet from the street wall and was exposed to public view in October, 1900, after severe roadside cutting and removal of Viburnum and other shrubs by the Superintendent of streets and his men. No trees have been planted along this wall for at least thirty-three years to my certain knowledge, and I believe the field has been an open pasture for many years longer.

To explain its presence on this Massachusetts highway the story has gained credence that it sprang from an acorn thrown into the field by a soldier just returned from the South. Readville camping ground is a half mile away and regiments returning from the war were often quartered here for weeks before discharge. The probable age and general appearance of the tree and its surroundings lend color to this invented story. No one imagines that the tree was planted by the hand of man. It bears fruit pretty regularly, but no one has seen any seedlings in the vicinity.

The very persistent foliage makes it a conspicuous tree in the late fall and winter: it is green till almost Christmas and its last leaves have not fallen by the first of March. It is certainly "a distinct and desirable ornament" of the country roadside and as it is owned by a lover of trees we may hope it will be carefully guarded for another century.

Readville, Massachusetts.

A New Variety of Juncus balticus.— *Juncus balticus* Willd., var. **melanogenus**, n. var., caulibus tenuibus teretibus 1–3 dm. altis circa 1 mm. diametro; cataphyllis basilariis flavo-stramineis lucidis; inflorescentia compactis circa 1 cm. diametro; bractea 6–11 cm. longa; sepalis 4.5–5 mm. longis subaristatis castaneis quam petalas paullo longioribus; petalis similibus albo-marginatis; antheris filamentis duplo vel triplo longioribus; capsulis ovoideis longe mucronatis 3-locularibus atratis vel badiis perianthiis vix equantibus.

Stems slender, terete, 1–3 dm. high, about 1 mm. in diameter: basal sheaths yellowish-straw-color, shining: inflorescence compact, about 1 cm. in diameter: bract 6–11 cm. long: sepals 4.5–5 mm. long, subaristate, castaneus, a little longer than the similar but white-margined petals: anthers twice or thrice as long as the filaments: capsule ovoid, long-mucronate, 3-celled, black or dark-chestnut, scarcely equaling the perianth.— Quebec: sand dunes, Bradore, Saguenay County, August 4, 1910, *Fernald & Wiegand*, no. 2992.— In its 3-celled capsule closely related to var. *montanus* Engelm. of the Rocky Mountain region, but differing in its darker perianth and capsule and lighter-colored basal sheaths, var. *montanus* having the more elongate capsule paler than the perianth and the basal sheaths brown or reddish.— M. L. Fernald and K. M. Wiegand.

SOME PANICUMS OF ESSEX COUNTY, MASSACHUSETTS.

F. Tracy Hubbard.

During this autumn's collecting of *Gramineae* and *Cyperaceae* in and about Manchester, Massachusetts, several interesting species of the genus *Panicum* were found. Among these there are several, at present, rather rare species; one in particular, *P. lucidum* Ashe, which has not been reported from the state. Several others are range-extensions and many of them do not seem to have been reported from Essex County.

The following species are the more noteworthy.

Panicum lucidum Ashe. Hitchcock and Chase, *North American Species of Panicum*, do not cite this species from New England, though Mrs. Chase informs me that since the revision of *Panicum* she has seen specimens from Pomfret, Connecticut, July 4, 1901, *A. W. Driggs* no. 4 and two collections from Stonington, Connecticut, June 23, 1901, *C. H. Bissell* no. 5576; *L. Andrews*, July 13, 1902; the last doubtfully to be referred to this species. There is no specimen of this species from New England in the Gray Herbarium, and it is not represented in the Herbarium of the New England Botanical Club. My specimens are: No. 129a, rich wooded roadside, near

Ayer's Pond, Manchester, Sept. 28, 1911 and No. 193, hillside among ledges, West Manchester, Oct. 11, 1911.

Specimens of these two numbers were sent to Mrs. Chase of the Bureau of Plant Industry, and determined by her. She writes me in regard to No. 193 that "specimens from the northern limits of its range do not seem to develop the almost vine-like habit in the autumnal phase, characteristic of the species here and southward, though your 193 is the first late autumnal specimen we have received from New England. We had not seen any from New England when the revision was published. Yours is the northernmost record as yet, and your specimen the nearest typical from New England." From a note on No. 129a Mrs. Chase would seem to lay specific distinction on the comparative conspicuousness of the epidermal cells of the under surface of the blades.

Panicum tennesseense Ashe. Hitchcock and Chase, l. c., cite this from Massachusetts, Framingham, *Smith*, nos. 741, 743. Represented in the Gray Herbarium from Massachusetts, Framingham, E. C. Smith, (no number). There are Massachusetts specimens in the Herbarium of the New England Botanical Club from Magnolia, *C. H. Clarke*; Boston, 1882, *Chas. E. Perkins*. My specimens were verified by Mrs. Chase and are No. 153, rich wooded roadside, Wenham, Oct. 3, 1911; No. 170, rocky wooded hill, Manchester, Oct. 7, 1911, and No. 174, low hollow — prostrate —, Manchester, Oct. 8, 1911.

This species has been sparingly reported from Massachusetts and if the Clarke collection is typical, as it seems though unverified, has been previously found,— though apparently not recorded,— in Essex County. As this species is represented in the Gray Herbarium by specimens from New Brunswick, all the New England states and southward, it seems as though careful collecting would show it to be more widely distributed in Massachusetts than it is now known to be.

Panicum languidum Hitchc. & Chase. Hitchcock and Chase, l. c., cite this species in Massachusetts from Ashburnham, *Harris*, 1896. Not represented from Massachusetts in the Gray Herbarium. In the Herbarium of the New England Botanical Club, Massachusetts, is represented from Ashburnham, July 12, 1896, *Sydney Harris* (two sheets). My specimen is No. 205, gravelly roadside, West Gloucester, Oct. 13, 1911.

A specimen of this number was sent to Mrs. Chase and the determination is here. She writes, "No. 205 is not typical, the blades being

glabrous above; but such 'vernal' culms shooting up in the fall often depart from the usual characters of a species."

This rare species, the type of which was collected by M. L. Fernald in Maine has also been collected from Maine by Parlin and by Fernald at several locations, and from Vermont, Hartland, *Ruggles* no. 49 (the last on the authority of Mrs. Chase), as well as from Massachusetts, as reported above. The Ashburnham specimens of Harris have a noticeably different habital aspect from the Maine specimens of Fernald and from my No. 205 and the lower branches of the panicle do not have the same marked droop which is so noticeable in Fernald's Maine specimens and only slightly less marked in my No. 205. However these Harris specimens bear the verification of Hitchcock and Chase as shown by their revision labels and consequently must be accepted as correctly named. Seemingly new to Essex County and eastern Massachusetts.

Panicum tsugetorum Nash Hitchcock and Chase, l. c., cite from Massachusetts, Framingham, *Smith*, no. 740. Represented in the Gray Herbarium from Massachusetts, Woburn, *M. L. Fernald & E. F. Williams*; Framingham, *E. C. Smith* (no number). In the Herbarium of the New England Botanical Club, Massachusetts, is represented from Boston, 1881, *C. E. Perkins*; Housatonic, Berkshire County, 1906, *Ralph Hoffmann*. My specimens are No. 169, rich open woods, Manchester, Oct. 7, 1911; No. 180, sterile soil, Beverly Farms, Oct. 9, 1911; and No. 187, bushy roadside, Conomo Road, Essex, Oct. 9, 1911.

Specimens of these numbers were sent to Mrs. Chase and determined by her. From her notes, good specific characters would seem to be the long first glume, the short ligule, the short crisp pubescence on culm and sheaths and the thin white margin of the blades.

This species is represented in the Gray Herbarium by specimens from Maine, Vermont, Massachusetts as above cited, Connecticut, New York, southward and westward,— hence it should prove more widely distributed in Massachusetts.

Panicum columbianum Scribn. Hitchcock and Chase, l. c., cite from Massachusetts, Wellesley, *Smith*, no. 738; Framingham, *Smith*, nos. 742, 744. Not represented from New England in the Gray Herbarium. In the Herbarium of the New England Botanical Club there is a Massachusetts specimen from Stoneham, *W. P. Rich*, no. 343 in part. My specimens are No. 118, ballast of R.R., West

Gloucester, Sept. 27, 1911, and No. 166 rich open woods, Manchester, Oct. 7, 1911.

Specimens of these numbers were sent to Mrs. Chase and determined by her. Apparently this species is new to Essex County. Other Massachusetts stations have been reported in Rhodora **1**: 98 (1899) and **3**: 126 (1901).

Panicum oricola Hitchc. & Chase. Hitchcock and Chase, l. c., cite from Massachusetts, Nantucket, *Bartlett*, no. 1368, 1379, et al.; Plymouth, *Oakes*; Quanquisset, *Bartlett*, no. 1327. Represented from Massachusetts in Gray Herbarium from Plymouth, Oakes. In the Herbarium of the New England Botanical Club, Massachusetts, is represented by Eastham, *F. S. Collins*, nos. 248 & 293; Truro, *W. P. Rich*; Hyannis, *Churchill*. My specimen, verified by Mrs. Chase, is No. 158, dunes Ipswich Beach, Ipswich, Oct. 5, 1911.

There seems to be no previous record of this species north of Cape Cod, but Mr. M. L. Fernald informs me that he collected it on the Ipswich dunes about a week later than I.

Panicum Ashei Pearson. Hitchcock and Chase, l. c., cite from Massachusetts, Malden, *Fernald*, 1891, in part; West Quincy, 1894, *Churchill*. Represented in the Gray Herbarium from Massachusetts, Melrose, *W. P. Rich*; Middlesex Fells, *Koehler*. In the Herbarium of the New England Botanical Club are Massachusetts specimens from Melrose, *W. P. Rich*, nos. 235a, and 291; Weston, *E. F. Williams*; Blue Hills, *Warren H. Manning*; Housatonic, Berkshire County, *Ralph Hoffmann*. My specimen is No. 194, among bushes, rocky hillside, West Manchester, Oct. 11, 1911.

A specimen of this number was sent to and verified by Mrs. Chase. This collection extends the known range of the species slightly northward.

A complete list of the Panicums collected in Essex County from Sept. 26–Oct. 13, 1911, is as follows. Where there are specimens in the Gray Herbarium or the Herbarium of the New England Botanical Club or where there are published records of the species from Essex County. I have noted the fact.

P. capillare L. N. E. Bot. Club; Robinson, Fl. Essex Co., 130 (1880).

P. dichotomiflorum Michx. Robinson, l. c., 129 (1880) sub. nom. *P. proliferum* Lam.

P. virgatum L. N. E. Bot. Club; Robinson, l. c. 130 (1880).

P. agrostoides Spreng. N. E. Bot. Club; Rhodora **3**: 101 (1901).

P. depauperatum Muhl. Gray; N. E. Bot. Club; Rhodora **3**: 107 (1901).

P. linearifolium Scribn. Rhodora **3**: 108 (1901).

P. dichotomum L.

P. lucidum Ashe.

P. spretum Schultes. N. E. Bot. Club; Hitchc. & Chase, N. Am. Sp. Pan. 202 (1910).

P. huachucae, Var. *silvicola* H. & C.: Hitchc. & Chase, l. c., 217 (1910).

P. implicatum Scribn.

P. oricola H. & C.

P. subvillosum Ashe. Gray; Hitchc. & Chase, l. c., 228 (1910).

P. tennesseense Ashe. N. E. Bot. Club (Clarke specimen).

P. languidum H. & C.

P. tsugetorum Nash.

P. columbianum Scribn.

P. sphaerocarpon Ell. Gray.

P. Ashei Pearson.

P. Scribnerianum Nash. Gray; Rhodora **3**: 113 (1901).

P. clandestinum L. N. E. Bot. Club (a ? fragment); Rhodora **3**: 110 (1901).

This list is, of course, a very incomplete one of the Panicum of Essex County, but it may prove of some interest and may also lead others who have collected in this county to report their finds.

Cambridge, Massachusetts.

A Third Station in Vermont for Cyperus Houghtonii.— In an article in Rhodora for July, 1903, I told of my discovery of the second station for *Cyperus Houghtonii* Torr. in Vermont in 1901. Dr. Ezra Brainerd, who identified the plants for me, expressed doubt at the time as to it being native since it occurred but a few rods from a railroad. But during the past season his doubts were removed by the finding by himself of a third station for the plant in Castleton. This last station is so far from a railroad as to make him feel assured that the species is indigenous. It is in the same habitat as the stations spoken of in my article referred to above, dry shifting sand.— Nellie F. Flynn, Burlington, Vermont.

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FREDERICK WILLIAM BATCHELDER.

MARIA L. OWEN.

A gentle, unassuming, lovable life came to its earthly close when Frederick W. Batchelder left us. The task of writing a fitting notice of him for a botanical journal is a hard one; for those who knew him, the man is so much more than the botanist, that with a heavy heart and with eyes that scarcely see through tears, the tribute which he well deserves in this magazine is attempted.

Frederick W. Batchelder was born in Pelham, N. H., in 1838, son of Dr. Amos Batchelder and Rebecca (Atwood) Batchelder, a descendant on his father's side from the Rev. Stephen Bachiler who came over from England in 1632. In the nearly three centuries which have elapsed since that time, the spelling of the name has undergone many changes, for every branch of the old divine's posterity seems to have had its own way. The common ancestor of all was excommunicated in his own country for his independent religious opinions, and in this country too, the sturdy and brave old parson was so persecuted for his departure from the ecclesiastical ruts to which he was constitutionally averse, even his moral character being assailed, that after some twenty years here, he shook off the dust of New England from his feet, and returned to Old Boston, England, where he died at the age of 100, a man of great vigor physically and intellectually. His character is thoroughly vindicated in our times from the injurious charges which prevailed against it for two centuries.

On his mother's side Mr. Batchelder came down from Hugh Tallant of whom Whittier wrote in "The Sycamores." The poet gives many verses to him as a story-teller and musician, but Hugh was much more than a "rustic Irish gleeman." He was a man of great force of char-

acter. Coming a poor immigrant, he soon acquired property in New Hampshire, where he lived as a good citizen, adding to the happiness of all who knew him "with his eyes brimful of laughter, and his mouth as full of song." He came from Ireland, but he was a member of the church of England, and probably from one of the "transplanted" English families of Cromwell's time. Our friend just lost had his musical gifts in fullest measure, and his gaiety of temperament; would that he might have inherited the vitality of these two ancestors, for Hugh lived through a vigorous old age to be 108.

The young Batchelder was fitted for Harvard in the Boston Latin School, and was graduated from college in the "fighting class" of 1860 — the class of whose 146 members 79 went to the war and 19 gave their lives. Mr. Batchelder entered the service as surgeon steward in the navy, on the bark Kingfisher of the South Atlantic blockading squadron, and after thirteen months of service was honorably discharged on account of disability.

From that time he made Manchester, New Hampshire, his home except for a few years spent in Springfield, Massachusetts. He married, in Manchester, Miss Annie Varney, daughter of the Hon. David Varney of that city.

The lifework of the young man was already outlined at his graduation. He had studied medicine under Dr. Oliver Wendell Holmes, and had been a pupil of Agassiz. He became an excellent botanist in after years and also an ornithologist of good standing. His catalogue of the plants of southern New Hampshire and his editing of Allen's "Birds of New Hampshire" and Wright's "Birds of the Jefferson region" show what thorough work he could do in both these branches of science. Thoroughness, indeed, was a characteristic of all that he did.

Mr. Batchelder was gifted in many ways, but he was, first of all, a musician. As a composer, particularly for the organ, he had high rank; the fine quality and originality of his work were recognized as admirable by the best judges; but his musical and scientific work were both hampered by ill health. For the last fifteen years of his life he worked constantly with more or less suffering, but always persistently, cheerfully and with indomitable courage. Neither ill health nor ill fortune could ever shake his beautiful optimism, as prominent and winning a trait as any part of his character. He was an organist for fifty-two years without interruption, from his college

days at Harvard, when he played in Appleton Chapel, to his last service in Manchester only two weeks before his death.

Music and bird lore were combined in his very careful and accurate transcription of bird songs and calls which he used from time to time, illustrating them on the piano, in the ornithological section of the Manchester Institute of Arts and Sciences. They were very highly thought of by those who heard them, though not satisfactory to Mr. Batchelder, because the bird song needs the sliding scale, which the piano does not have. He had studied carefully the birds of the Connecticut Valley, and later of the Merrimac Valley; indeed he observed them wherever he was, but here again his work was limited by ill health, particularly in the case of the game, water and shore birds. He was a constant contributor to the magazine, *Nature Study*, published by the Institute, where his articles, excellent for their matter upon birds and plants, had an added value from the beauty of their style. Whatever came from his pen was charming,— clear, direct and simple, and with the delicious humor coming out suddenly in the most unexpected places.

He loved to be with young people, and they, whatever their connection with him might be, were devoted to him — his choir, the young botanists and ornithologists to whom he was always a helpful friend, those engaged in various other branches of Institute work and those who only knew him socially; they all enjoyed his society, and never realized any disparity of years, so youthful was his spirit.

His knowledge was freely at the service of all who wanted it, and those far advanced in science often had something to learn of him, but for all this he sought no recognition. He was continually studying and learning from pure love of nature, and the glad helpfulness of his disposition made him always ready to impart from his gains; whether he was making a name in the world was far from his thoughts.

A loyal son of Harvard, he was the beloved president of the Harvard Club of Manchester, and the dean of the Alumni of the same city. His last musical composition was "A Hymn to Harvard" with Latin words which he wrote for the July meeting of the New Hampshire Harvard Club at Walpole. He did not feel equal to attending, but they had asked him for a poem, and he sent this as his contribution.

An attack of grip some ten years ago left him with chronic bronchitis and asthma which, in their turn, induced a peculiar weakness of the heart. These troubles incapacitated him for active work in his pro-

fession, but he could not give up his music entirely; he played the organ in church, and directed his choir to the last. But work which did not confine him to fixed hours was still in his power, and such occupation he took up with unfailing courage. His indomitable spirit was never impaired by his semi-invalidism, and work of lasting value for the Manchester Institute mentioned elsewhere in this paper, was begun and carried on through the rest of his life, and this courage and persistence in work were lighted up with a gaiety and delightful humor which pervaded and sweetened everything which he said or wrote.

The summer of 1911 with its long heated term was very trying to Mr. Batchelder and he weakened under it; he went with his wife and her sister to the Isles of Shoals, a favorite resort of his; he enjoyed his stay there, but the sea level did not agree with him. They went next to another loved locality, Chocorua, amongst the Sandwich mountains, where he had spent eight happy summers. Here too he had great joy, although unable to walk beyond the house grounds. They came home the 15th of September, and for a week he seemed to have regained some strength; after that a slight shock from which he was too weak to rally, proved the beginning of the end. He lived two weeks longer gradually sinking, but with his mind clear to the last, and on the 11th of October he passed away as peacefully as he had lived.

Although Mr. Batchelder had been interested in botany during his college days, it was not until the death of his daughter in 1887 that, as a mental diversion, he took up serious botanical work. He then began the accumulation of a private herbarium to represent his region of the Merrimac Valley. Soon after the formation in 1898 of the Manchester Institute of Science he presented his herbarium to the Institute. In 1902 this collection, together with a large number of additions made to it by Mr. Batchelder, was destroyed by fire, but immediately thereafter he set to work upon a new herbarium. This, at the time of his death, comprised 3,500 sheets. In 1900, in the Proceedings of the Manchester Institute, he published his *Preliminary List of Plants growing without Cultivation in the Vicinity of Manchester, New Hampshire,* followed in 1901 and 1902 by *Additions to the Preliminary List of Plants*, and in 1909 by a complete revision of the *Preliminary List*; a work which will always be used by students of geographic distribution with the assurance that it was based upon accurate

knowledge of the local flora. Besides this *List,* which stands as Mr. Batchelder's most important technical publication in botany, frequent notes from his pen were published in RHODORA, and his name is familiar to New England botanists as the author of the combination *Glyceria borealis* (Nash) Batchelder.

MANHASSET, NEW YORK.

NOTES ON CONNECTICUT MOSSES,—III.

G. E. NICHOLS.

IN his last paper on Connecticut mosses [1] the writer called attention to the northwestern part of the state, and especially to the town of Salisbury, as a favorable collecting ground. At that time eighteen species of hepatics and mosses were known from no other locality. This number has since been raised to twenty-six. In the present series of notes eleven mosses are recorded from Connecticut for the first time. Of these, nine represent additions due to recent explorations, while the remaining two have previously been reported under other names.

FISSIDENS VIRIDULUS (Swartz) Wahl. Bolton and Danbury (G. E. N.); Hamden (J. A. Allen, 1880); East Haven (Kleeberger). For some time it has been evident to the writer that the Connecticut material which has been passing as *F. incurvus* Schwaegr. (including *F. minutulus* Sull.)[2] comprised a number of distinct forms. Recently all of the available Connecticut specimens, some sixteen packets in all, were submitted to Mr. H. N. Dixon of Northampton, England, for examination, and some of his observations will be of interest to American bryologists. The broad conclusion that he comes to is that there is at any rate none of the true *F. incurvus* in the lot. Moreover, none of the specimens seem to agree with the descriptions of *F. minutulus.* Mr. Dixon divides the Connecticut specimens into several groups, one of which, as already indicated, he assigns definitely to *F. viridulus.* A second group, comprising specimens collected by the writer in Salisbury and North Branford, he refers to *F. viridulus* var. *Lylei* Wils. (= *F. exiguus* Sull.). The remaining

[1] RHODORA **13**: 40. 1911.

[2] See Evans and Nichols: Bryophytes of Connecticut 104. 1908.

groups he hesitates to name definitely at the present time, although he remarks that some of the specimens very likely represent forms of *F. viridulus* while others approach *F. obtusifolius.*

F. incurvus and *F. viridulus* are both common and well known British species. The probability that the latter is widely distributed in this country has not, however, been generally appreciated. By many of the European writers of the present day the two are considered conspecific, but both Braithwaite and Dixon consider them distinct. They are indeed uncomfortably close, but in a case like this it is necessary to emphasize small dissimilarities. The most striking difference between the two, and one that makes them appear distinct at a glance, is seen in the form and degree of inclination of the capsules. In its typical form *F. incurvus* possesses a strongly curved and cernuous or horizontal capsule, while in *F. viridulus* the capsule is usually symmetric and erect or only slightly inclined. In a recent letter Mr. Dixon remarks that he will not venture to say how far the curving of the capsule is a constant character; there are indications that it may not be; there are certainly intermediate forms. But so far as the character goes the writer, after examining a number of British specimens, agrees with Mr. Dixon that there is nothing among the Connecticut specimens like the typical *F. incurvus* of Europe. Incidentally, the habitats of the two mosses are suggestive. The European manuals describe *F. incurvus* as growing commonly on clay banks and roadsides or in fields. The American plant, on the other hand, is ordinarily associated with moist rocks and only rarely does it occur on earth; in the writer's experience it is to be looked for on boulders in streams or on rocks in shady ravines, but never in open fields. The variety *Lylei* is a very small plant whose leaves, except on the vaginant lamina, lack the narrow-celled border which is so characteristic in the typical form of the species.

Gymnostomum rupestre Schleich. On limestone in moist shaded ravines, altitude about 800 feet, Salisbury (G. E. N., 1911). Determined by Mrs. E. G. Britton and Dr. A. LeR. Andrews. The Connecticut specimens are rather short, hardly 1 cm. in height, and presented somewhat the same general field aspect as a *Rhabdoweisia.* The nearest relative among our local mosses and the only thing with which there is really any danger of confusing it is *Hymenostylium curvirostre.* The generic distinction between these two seems to be derived from the fact that in *Gymnostomum* the lid falls off from the

capsule at maturity, whereas in *Hymenostylium* the lid remains attached to the capsule by the dried-up columella. The leaf characters of the species in question are also different. In *G. rupestre* the margin is plane or nearly so, and the cells in the apical region are small and poorly defined; in *H. curvirostre* one or both margins are recurved below, while the cells in the apical region are larger and distinct. The present species ranges more or less extensively through Canada and reaches southward, principally along the mountains, into the northern United States. It has previously been reported from at least two of the New England States, Vermont and Massachusetts, and is common to Europe, Asia, and Africa. The spores ripen in late summer.

Tortula mucronifolia Schwaegr. On shaded calcareous shale ledges along the Farmington River, altitude 100 feet, Windsor (collected and determined by Miss Lorenz, 1911). This is the only smooth-leaved *Tortula* that is likely to be found in New England. The species is monoicous so that capsules are usually present, the spores maturing in summer. It should be easy to recognize in the field by the smooth hair-points on the leaves and by the peculiar peristome, which conforms to the familiar *Barbula* type but has a basal membrane nearly half the height of the entire structure. *T. mucronifolia* has been recorded from Vermont and Massachusetts; it is widely scattered through Canada and the northern United States, extending southward in the West to Colorado, Nevada, and California, and is common to both Europe and Asia.

Tortula ruralis (L.) Ehrh. On dry sandy soil over limestone, altitude about 750 feet, Salisbury and Canaan (G. E. N., 1911). During dry weather there is at least a superficial resemblance between this plant and the short, sterile form of *Polytrichum piliferum* which is common in similar habitats. This is due mainly to the long, hyaline arista which is such a conspicuous feature of the leaves in both mosses. In *T. ruralis* and in the closely related *T. montana* this arista is thickly beset with spiny teeth; in the other Connecticut species — *T. muralis* *T. papillosa*, *T. mucronifolia* — it is smooth. *T. ruralis* and *T. montana* can be distinguished from one another by the following leaf characters: *T. ruralis* — leaves squarrose when moist, margin strongly recurved almost to the apex, upper cells 12–16 μ in diameter; *T. montana* — leaves erect-spreading when moist, margin recurved below but plane in the apical region, upper cells 9–10 μ in diameter. *T.*

ruralis is one of the most cosmopolitan mosses, being known from all of the great continental areas. In temperate North America it is widely distributed, but it is apparently much commoner in the West than in the East. The only other New England stations for it that the writer has found record of are in Vermont and Massachusetts. Fruit, when developed, matures in summer, but the plants are commonly sterile.

Racomitrium sudeticum (Funck) Br. & Sch. Mr. R. S. Williams has referred to this species the specimens recently described by the writer [1] as *R. fasciculare.* In general aspect the two species are often similar. But in *R. sudeticum* some at least of the leaves possess short, denticulate, hyaline hair-points, while the upper leaf-cells are roundish-quadrate in shape. The leaves of *R. fasciculare* are always obtuse, never developing hyaline points, and throughout the leaf the cells are from three to five times as long as broad. *R. sudeticum* is quite common in the Salisbury hills and is known from all of the New England States except Rhode Island. Its general distribution is similar to that already given for *R. fasciculare.*

Anoectangium lapponicum Hedw. On precipitous schistose rocks in a moist ravine, altitude 1600 feet, Salisbury (G. E. N., 1911). Fortunately this moss usually fruits abundantly and the capsules, strongly plicate when dry and empty and barely emergent above the perichaetial bracts, render it easy of recognition. The other Connecticut species, *A. Mougeotii,* is dioicous and rarely fruits. *A. lapponicum* is autoicous, the antheridial buds being situated in the axils of the upper leaves and readily demonstrable in most cases. It has been recorded from Maine, New Hampshire, and Vermont, but is evidently much less frequent in New England than the other species. It ranges throughout the northern part of this continent, with a southerly extension in the East as far as the mountains of Alabama, and is found also in Europe and Asia. The capsules mature in late summer.

Leucodon sciuroides (L.) Schwaegr. On the bark of a tree, altitude 150 feet, Ledyard (G. E. N., 1911). As Grout observes,[2] this species can usually be recognized in the field by the flagelliform branches which are frequently produced in such abundance as to cause the plant to appear deformed. The leaves differ from those of the

[1] Rhodora **13**: 43. 1911.
[2] Mosses with Hand Lens and Microscope 389. 1910.

other two American species, *L. julaceus* and *L. brachypus,* in their more narrowly acuminate, longer-celled and nearly entire apices. On this continent *L. sciuroides* appears to be occasional through eastern Canada, while it has been reported from New York and Pennsylvania and from all of the New England States but Rhode Island. It is a common European moss and is also known from Asia and Africa.

Elodium Blandowii (Web. & Mohr) Broth. In a calcareous swamp, altitude 750 feet, Salisbury (A. W. Evans, 1911). The larger size, more ascending habit, and regularly pinnate branching give to this handsome moss a quite different appearance in the field from the common and closely related *E. paludosum,* the only other American representative of the genus. When dry the plants bear a superficial resemblance to *Thuidium abietinum,* but the different habitats of the two, together with the softer texture of the present species, preclude any possibility of confusion. Fruit is usually borne in more or less abundance, the spores maturing in May or June. According to Best [1] the American distribution is as follows: Greenland; Labrador; Canada and British Columbia; southward to Idaho; Colorado; New York; Vermont. It has now been reported from all of the New England States but Rhode Island. Native to Europe and Asia.

Drepanocladus pseudofluitans (San.) Warnst. At the margin of Twin Lakes, altitude 750 feet, Salisbury (G. E. N., 1911). Determined by Warnstorf. This is one of those variable and intergrading forms which group themselves so closely about *D. subaduncus* (L.) Warnst. (= *D. aduncus* of most authors). Whether or not it has justifiable claim to specific rank seems open to question. Renauld,[2] Mönkemeyer,[3] and Loeske,[4] after a critical study of numerous specimens both in the field and in herbaria, are of the opinion that this and similar forms, such as *D. Kneiffii* and *D. gracilescens,* represent merely varieties of *D. subaduncus* which are due largely to seasonal changes and ecological factors. Dixon, Grout, and Brotherus support this same view. But on the other hand equally careful students, prominent among whom are Limpricht and Warnstorf, regard many of these forms as distinct species. In its typical form *D. pseudo-*

[1] Bull. Torr. Bot. Club **23**: 89. 1896.
[2] Rev. Bryol. **33**: 89–100. 1906; **34**: 7–14. 1907.
[3] Sitzungsber. d. Naturf. Gesellsch. zu Leipzig 1–25. 1906.
[4] Zur Morphologie und Systematik der Laubmoose 24. 1910.

fluitans is more robust than any of the other species in the *subaduncus* group, but it bears a marked resemblance to *D. Kneiffii* and the two are very liable to be confused. In *D. pseudofluitans* the leaves often reach a length of 5 mm. and throughout the plant are pretty uniformly ovate-lanceolate in shape, tapering gradually toward the apex. In *D. Kneiffii* the leaves almost never exceed 4 mm. in length and are dimorphic; of the two types of leaves one resembles those of *D. pseudofluitans* in shape, but the other is broadly ovate and tapers rather abruptly. Both kinds of leaves are usually present in the same individual. Furthermore, in *D. pseudofluitans* the leaves near the tip of the shoot have a tendency, which is usually not evident in *D. Kneiffii*, to wrap themselves more or less loosely around the stem. The length of stem is also said to differ, but specimens of each species have been collected by the writer in which the stem measured fully a foot in length. On the whole, however, the distinctions which can be brought out in a description are rather unsatisfactory for, as Loeske remarks,[1] the two forms are more readily separated by their general habit than through any anatomical differences. *D. pseudofluitans* sometimes grows in ditches or in shallow depressions which are dry during the summer, but in such habitats it is poorly developed. It thrives most luxuriantly in places where it is almost completely submerged throughout the year. In a locality of this sort along the lakeward margin of a swamp which borders one of the Twin Lakes there are pure mats of *D. pseudofluitans* many square yards in extent. The range of this species has not been definitely established, but for the present it may be assumed that its distribution coincides approximately with that of *D. subaduncus.* So far as the writer is aware no other New England stations have been published.

In passing it is worthy of note that this moss, together with *D. Sendtneri* var. *Wilsoni* [2], which occurs in the same locality, may be of considerable importance locally in connection with the production of marl. Davis has shown [3] that the extensive marl accumulations, which are a well known feature of lakes in limestone regions, are largely the result of plant activity, and he has cited a number of algae and seed plants which play an important rôle in this connection. In

[1] Moosflora des Harzes 308. 1903.

[2] *D. Wilsoni* Schimp. is often treated as a separate species, but by Warnstorf it is regarded merely as a variety of *D. Sendtneri.*

[3] Geol. Surv. Mich. **8** [1]: 65–100. 1903.

the present case the leaves and stems of the two mosses referred to above were covered with a thin, loose crust of calcium carbonate which they had apparently precipitated from the water, and which gave them an unnatural grayish-white appearance.

Drepanocladus vernicosus (Lindb.) Warnst. In a boggy swamp at the margin of Twin Lakes, altitude 750 feet, Salisbury (G. E. N., 1911). Determined by Warnstorf. With the exception of *D. scorpioides* this is the only one of the *Drepanocladi* in which the stem lacks a central strand. It also differs from all the other *Drepanocladi* thus far recorded from Connecticut in the total absence of specially differentiated alar cells. On the whole *D. vernicosum* is a northern moss and has been rather infrequently collected in the United States, the only stations in the East that have come to the writer's attention being in Ohio, western New York, eastern Pennsylvania, northern New Jersey, and northwestern Vermont. It is found in both Europe and Asia.

According to the majority of the European authorities this moss is confined to swamps and bogs that are free from lime; so that on first thought it would hardly be looked for in the Twin Lakes swamp which overlies marl deposits of considerable depth. So far as the writer has observed, however, it does not occur around the lakeward border of the swamp but grows at a distance from the open water, in places where a considerable thickness of peat has been laid down. And this seemingly restricted distribution suggests a possible explanation for the anomaly. As has been pointed out by Transeau [1] humic acid, which is particularly abundant in peaty soils, forms insoluble compounds with alkaline earths. So that where there is an appreciable depth of peat the vegetation growing at the surface may be affected little or not at all by the calcareous nature of the substratum, owing to the fact that whatever lime may be dissolved in the water will be precipitated through the action of the humic acid before it has penetrated far into the peat.

Climacium dendroides (L.) Web. & Mohr. On moist banks in a ravine, altitude 1600 feet, Salisbury (G. E. N., 1911). Determination verified by Dr. Grout. The seeming rarity of this moss in most parts of the East may in all probability be accounted for by the fact that it is usually mistaken for the better known species, *C. americanum,* which it closely resembles in habit and general appearance.

[1] Bot. Gaz. **40**: 375. 1905.

But the branch leaves and capsules in the two plants are quite distinct. In *C. americanum* the leaf bases have broad, crispate auricles, and a large proportion of the leaves are acute. In *C. dendroides* the leaves may be slightly auriculate but the auricles are usually flat, while the majority of the leaves are very obtuse. The areolation also differs, the median cells in the former being from five to seven, in the latter from seven to ten times as long as broad. The capsules of *C. dendroides* ripen in late autumn and are much smaller than those of *C. americanum.* It probably occurs throughout northern North America and has been accredited to Maine, New Hampshire, and Vermont. Also common to Europe and Asia.

In addition to the mosses listed above there are a number of new stations for species which have heretofore been known from but one or two localities. These are as follows: *Fissidens bryoides* forma *inconstans* Schimp., Farmington (Miss Lorenz); *Encalypta ciliata,* Salisbury (A. W. Evans); *Schwetschkeopsis denticulata,* Colebrook (G. E. N.); *Myurella julacea,* Salisbury (Miss Lorenz); *Thuidium abietinum,* Canaan (G. E. N.); *Brachythecium acuminatum* and *Amblystegium vacillans,* Salisbury (G. E. N.). *Anacamptodon splachnoides* may also be recorded from two more towns, Colebrook and North Branford (G. E. N.). At the present writing 309 species of mosses are known to occur within the limits of the state. Three species have been dropped from the list and thirty have been added during the last four years. During the same time the number of hepatics has been increased from 107 to 128, thus making a total at this time of 437 bryophytes in Connecticut.

In conclusion attention is called to a number of errors which have been noted in the Bryophytes of Connecticut. P. 101, *Dicranum fulvum* Hook. should read *D. montanum* Hedw.; synonym should be omitted[1]: p. 109, in the key to species of *Tortula* the characters should be interchanged to read as follows: *T. montana* — midrib excurrent into a long *toothed* hair-point; *T. muralis* — midrib excurrent into a long *smooth* hair-point. P. 111, in the key to species of *Grimmia* the characters of the leaf-cells in *G. conferta* and *G. apocarpa* have been exactly transposed. Also, the Stafford station for *Polytrichum alpinum,* reported in the last series of Notes[2], must be omitted; the mistake was due to a confusion of labels.

Yale University.

[1] Already noted by Howe: Torreya **9**: 37. 1909.
[2] Rhodora **13**: 46. 1911.

MORELS IN OCTOBER IN MASSACHUSETTS.

Julia Wingate Sherman.

Prizing mushrooms for their esculent qualities and having the mushroom hunger upon me, I went out the first of October to gather some *Tricholoma personatum.*

After having filled a large paper bag with that species and about a quart of *Marasmius oreades* — which has been conspicuously abundant the past season — I started for home well satisfied with my luck, looking forward to the enjoyment of these delicacies. As I was passing some recently turned soil where a granolithic sidewalk had been made, my attention was arrested by some morels growing at my feet. I picked about a dozen of varying size and shape.

When I reached home I attempted to look them up. I could find no records of morels being found in the autumn, nor could I find any description of a species which agreed perfectly with the specimens found. I put the morels in a white enamel plate to dry near the gas range. They gave off spores freely. These were of a rich pinkish yellow, apricot, I think it would be called.

At short intervals during the month I visited the locality where the morels grew. I found in all about seventy-five. The last were picked October 28th. Although I looked for them several times later none were found.

While I was inclined to think they were a form of *Morchella conica,* I could not completely identify them with that species owing to their manner of growth and to other peculiarities, for only the smaller ones were conical. As they increased in size the growth became lateral in cap and stem. About fifty per cent had an opening in the apex about a quarter of an inch in diameter.

They varied in size from the smaller conical ones, about the size of a lady's little finger, to the large broad ones, about twice the size of a hen's egg. The color of the pits, in fresh specimens, was smoky and dark; in some nearly elephant gray. The edges of the ridges between the pits were white or creamy, forming a beautiful contrast of color. The stem was larger at the base than at the top, which was wrinkled and brownish and rather squamulose or scurfy. Inside the morel was creamy white.

The location of these morels was peculiar. Many were growing on or near rocks. Only the small amount of clayey subsoil, which had adhered to the rocks, on their being thrown aside, made their growth possible. One large specimen was growing from the side of a square paving stone of granite. This clayey subsoil had been thrown under an elm tree by workmen who had recently completed the sidewalk mentioned. All the morels were found in a space of about fifteen square feet.

Specimens which I sent to Dr. Charles H. Peck of Albany, New York, for examination proved to be the first living morels he had ever seen in October. He found the spores from dried specimens to agree well with those of *M. conica*, although a few ran up to 32 × 20 μ in size.

The specimens ran smaller than typical *M. conica* and the scurf on the stem was darker colored. The color of the hymenium and the whitening of the edges of the ridges, the lateral growth and the tendency of all the larger ones to depart from the conical form, and the opening of the apex have led Dr. Peck to consider this plant a distinct variety, of which a description may be looked for in his next report. Hereafter, then, it will do no harm to look for morels in the fall.

Dr. Peck writes: "I have not before known of a morel appearing in autumn, and it may be an interesting question whether this should be considered a belated early summer form, or an extraordinary precocious spring form or an autumnal form pure and simple. If it never appears except in autumn I think it should be deemed worthy of specific distinction instead of varietal. Further observations must settle this."

Roslindale, Massachusetts.

[Specimens of this collection are in the herbarium of the Boston Mycological Club.]

SOLIDAGO CALCICOLA IN VERMONT.

George L. Kirk.

While botanizing on Mount Killington in September, 1910, in company with Harold G. Rugg of Hanover, N. H., and D. Lewis Dutton of Brandon, Vt., I found growing in an open spot by the road-

side leading to the old hotel at about 3700 feet elevation a goldenrod which attracted my attention from some distance because, unlike the other large-headed species which was growing in abundance all about (*S. macrophylla*), its inflorescence consisted of close spike-like racemes and it grew in a clump of considerable size. It was so late in the season that the material obtained was poor and the plant could not be determined satisfactorily but when some better specimens from the same station were sent to Prof. M. L. Fernald in 1911 he pronounced the plant to be *Solidago calcicola* Fernald. This is a new goldenrod for Vermont and a considerable extension of the range of this plant, which has heretofore been found within the limits of the United States only in northern Maine, having been collected elsewhere only in Gaspé county, P. Q. The Vermont material was taken a quarter of a mile below the rocky cone of Killington peak.

In gathering data for a revision of the Vermont Flora published in 1900 by Brainerd, Jones and Eggleston the writer has received the past season the following records of plants collected that are new to this state: *Bromus altissimus* Pursh and *B. incanus* (Shear) Hitchc., in Pownal, *R. W. Woodward; Carex Bicknellii* Britton, in Leicester, *Woodward; Muhlenbergia foliosa* Trin. and *Leptoloma cognatum* (Schultes) Chase, in Townshend, *L. A. Wheeler; Elymus australis* Scrib. & Ball, in Jamaica, *Wheeler; Molinia caerulea* Moench and *Polygonum tomentosum* Schrank., in Rutland, *Kirk; Scirpus Smithii* Gray, var. *setosus* Fernald, in Brandon, *Kirk; Sisyrinchium mucronatum* Michx., in Hartland, *J. G. Underwood; Oenothera pratensis* (Small) Robinson, in Hartland, *Miss Nancy Darling; Mimulus Langsdorfii* Donn., in Reading, *Whiting; Epilobium palustre* L., in Franklin, *Underwood; Aster puniceus* L., var. *lucidus* Gray, in Brandon, *Dutton.*

Rutland, Vermont.

Two rare Junci of eastern Massachusetts.— In May, 1910, when the Committee on Local Flora published their records for the *Juncaceae* (Rhodora, xii. 95–99), only one station each was known in eastern Massachusetts for *Juncus brachycarpus* and *J. effusus*, var. *decipiens* — the former at Scituate, the latter at Ipswich. Since these plants are so extremely local, not only in Massachusetts but in all New England, it is worth recording that in the Charles W. Swan

herbarium at Yale University there is a specimen of *J. brachycarpus* collected by Dr. Swan in "West Boston," May 15, 1884, and a sheet of *J. effusus*, var. *decipiens* collected by Dr. Swan at East Gloucester.— M. L. Fernald, Gray Herbarium.

Linum catharticum in Maine.— As I was lately revising my specimens of the genus *Linum* in my herbarium, I was surprised and pleased to come across a sheet of four fruiting specimens of the European Fairy Flax, *Linum catharticum* L., from "The Basin," Vinalhaven, Maine, collected by Mr. William W. Dodge, September 1, 1894. This is the first record for New England, but the Fairy Flax has been found at three stations in British America. Prof. John Macoun has reported it (Cat. Can. Pl., i. 501, 1886) "on waste ground along the seashore at Pictou, N. S." and Prof. M. L. Fernald has discussed and recorded it (Rhodora, v. 119, 1903) from Sydney, Cape Breton, and also (Rhodora, xiii. 116, 1911) as growing along the railway at Birchy Cove on the western coast of Newfoundland. Vinalhaven is an island at the mouth of Penobscot Bay and is 300 miles in a straight line from Pictou, the nearest recorded station for the species. Doubtless the plant occurs at other stations along the coast.— Walter Deane, Cambridge, Massachusetts.

Astragalus contortuplicatus on Wool-waste.— In June, 1911, on the J. V. Fletcher farm in Westford, Massachusetts, where wool-waste is used as a fertlizier, I found growing with *Thlaspi arvense, Sisymbrium Sophia*, and *Dracocephalum thymiflorum* (see Rhodora, xiii. 212) one plant of a Milk Vetch, which with the help of the Gray Herbarium has been named as: "*Astragalus contortuplicatus*, a native of eastern Europe, Siberia and Northern India. No American record is found of this species."— Emily F. Fletcher, Westford, Massachusetts.

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᾿Rhodora

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THE BOTANICAL AND OTHER PAPERS OF THE WILKES EXPLORING EXPEDITION.

Frank S. Collins.

The United States Exploring Expedition under the command of Charles Wilkes, U. S. N., started in 1838 and continued until 1842; the scientific results of the expedition were published in a series of volumes, the first in 1846, the last in 1874. In 1862 separates of the text and plates referring to the lower cryptogams are said to have been issued, with some plates representing phaenogams; the text for the former beginning with page 113; the text belonging to the latter, beginning with page 205, did not appear until 1874, when all were issued together as Vol. XVII, the title page bearing the double date 1862, 1874. In looking up the original descriptions of some species of algae published here, I found that the references to them by later authors were frequently erroneous, and I thought a note giving the correct references might be of use. While getting together the data for this I came upon some rather interesting facts in regard to other papers issued in the series, and my note has been gradually extended beyond the original plan. I will first give the results of my investigation as far as the algae are concerned, afterward and more concisely what I have found of interest as regards the rest of the series.

The work seems to be little known to writers on algae; it is not included in any of the bibliographies of De Toni, Sylloge Algarum, with the exception of a reference in Vol. I, p. IX, to the Diatomaceae, which occupy only 9 pages of the work; the reference is to Vol. VIII of the series, which is incorrect. In the very full synonymy and

lists of species inquirendae given by Bornet & Flahault[1] no reference is made to *Nostoc expansum*, described and figured in the Wilkes paper, p. 164, Pl. VI, figs. 1 & 2. Mme Weber-van Bosse,[2] however, cites the work, as do the Gepps,[3] but as will be seen later, the citations in both these cases must be revised.

Page 153 is the subtitle for the algae, and reads "Algae. By Jacob Whitman Bailey and William Henry Harvey," but whenever in the following pages the two names are given as joint authors of a species, the order, except among the diatoms, is reversed, being Harvey and Bailey,[4] which as will be seen later, is the correct form.

There is seldom anything to show whether a name appears here for the first time, either as a new species or as a new combination. A Latin diagnosis is sometimes given for a species attributed to some other author, without any citation; for instance *Gymnogongrus vermicularis* J. Ag.; on p. 164. Few synonyms are given, and in some instances they are printed exactly as independent species; for instance *Fucus vermicularis* Turn., on p. 164. Errors in spelling occur, like *Ectocarpus namulosus* for *E. hamulosus* on Plate VII. All these things tend to confuse the writer who wishes to cite from this work, but they are only the beginning of his troubles. One genus and four species, which have the appearance of being here published, had already been mentioned, with sufficient description, by Harvey; the genus *Chlorodesmis* in 1858,[5] *Dasya plumosa*[6] *Rhodymenia Wilkesii*,[7] *Gigartina mollis*,[8] *G. exasperata*.[9] No reference is made in the Wilkes paper to any of these earlier publications, with the exception of *Rhodymenia Wilkesii*, where we have in the text, p. 162, "A very

[1] Bornet & Flahault, Revision des Nostocacées Heterocystées, Ann. Sci. Nat., Ser. 7, Bot., Vol. VII, p. 177, 1888.

[2] A. Weber-Van Bosse, Monographie des Caulerpes, Ann. Jard. Bot. Buitenzorg, Vol. XV, p. 243, 1898.

[3] A. & E. S. Gepp, The Codiaceae of the Siboga Expedition; Siboga-Expeditie, Monogr. LXII, Leiden, 1911.

[4] The order "Bailey and Harvey" on the title, while the following species are "Harvey and Bailey," seems mere carelessness, but a possible explanation was suggested to me by an advertisement of a Philadelphia publishing house of a second edition of the narrative, Vols. I–V of the government issue. "Everything about this work will be STRICTLY AMERICAN. . . ." It may have occurred to some one that it would not be STRICTLY AMERICAN to put the name of Prof. Harvey of Dublin before that of Prof. Bailey of West Point.

[5] W. H. Harvey, Nereis Boreali-Americana, part 3, p. 29.

[6] W. H. Harvey, l. c., part 2, p. 66, 1853.

[7] W. H. Harvey, l. c., part 2, p. 147.

[8] W. H. Harvey, l. c., part 2, p. 175.

[9] W. H. Harvey, l. c., part 2, p. 177.

fine species, quite unlike any of the genus hitherto described." and a footnote, p. 161, "For the reasons given in the Nereis Boreali-Americana, 2, p. 147, the name of this species must be changed to *Rhodymenia pertusa*, J. Ag., Sp. Alg. 2, p. 376. W. H. H." *Chlorodesmis* is characterized as "Nov. Gen.," p. 172, but on p. 173 we find "[A second reputed species of this genus is described and figured in Harvey, Ner. Bor. Amer. 3, p. 30–40, but that may possibly be a *Derbesia*. W. H. H.]"

That these things should be published as new in 1862, with references to earlier descriptions in 1853 and 1858, is not the worst; the one genus and four species mentioned above, with another genus *Notheia*, and twelve other species in the Wilkes paper of 1862, were all properly published by Harvey and Bailey in 1851![1] The species in question are, in addition to those already mentioned, *Notheia anomala*, *Nostoc expansum*, *Ectocarpus hamulosus*, *Chondrus uncialis*, *Gracilaria filiformis*, *Gymnogongrus ? dendroides*, *Gelidium unilaterale*, *Liagora hirta*, *Caulerpa falcifolia*, *C. Pickeringii*, *Dictyota bidentata* and *Chlorodesmis comosa*. The seventeenth species of the 1851 list is *Hypriea* (probably a misprint for *Hypnea*) *Coulteri*, which does not appear in the 1862 work. There is no mention whatever of this earlier paper in the later work, while in the Nereis, under *Rhodymenia pertusa* we find the synonym "*Rhodymenia Wilkesii* Bail. & Harv. in Bot. Expl. Exped. cum Icone, ined.," and under *Chlorodesmis* the remark "The genus *Chlorodesmis* was founded by the late lamented Professor Bailey and myself on an alga brought by Captain Wilkes from the Feejee Islands."

It is not difficult to understand why the Harvey and Bailey paper of 1851 has been forgotten. It is possible that a careful search would find authors who mention it, but the only instances in algological papers that have come to my notice are Setchell & Gardner,[2] and Tilden.[3] But the unfortunate fate that has pursued the Wilkes algae from the start seems to have extended to both of these references; Setchell & Gardner include both the 1851 and the 1862 papers in their

[1] W. H. Harvey & J. W. Bailey, Description of seventeen new species of algae collected by the U. S. Exploring Expedition, Proc. Boston Soc. Nat. Hist., Vol. III, p. 371.

[2] W. A. Setchell & N. L. Gardner, Algae of Northwestern America, Univ. of California Publications, Bot., Vol. I, p. 165, 1903.

[3] Josephine E. Tilden, A contribution to the bibliography of American algae, Minnesota Botanical Studies, Vol. I, No. XXIII, p. 295, 1895.

remarkably accurate list of works referred to, but the 1862 paper is said to be in Vol. XIII, not XVII, of the Wilkes Expedition reports. This is probably a misprint, but, as will be seen later, some of the memoirs of this series may be found in different copies with different title pages, and there may have been an error in the volume number in this case. Unfortunately, the question cannot now be settled, as the copy used was destroyed in the San Francisco fire.

Miss Tilden makes no reference to the 1862 paper, and omits Bailey as joint author of the 1851 paper, placing it under W. H. Harvey only; and the date is vaguely given as 1848–1851.

With our present recognition of the necessity of accuracy in matters of publication and citation, such baffling and misleading work would be little short of criminal. Even after making allowance for the looser treatment prevailing fifty years ago, it is difficult to understand it. The two genera in question have been subjects of considerable study and discussion, and the fact that a date of publication later than the true one has been assigned to them might have had serious results in nomenclature. De Toni's Sylloge is the index to which one naturally first refers when looking up matters of this kind. In Vol. I, p. 439, 1889, we find "*Chlorodesmis* Bail. et Harv. [1858] in Harv. Ner. bor. Am. III, p. 29." In Vol. III, p. 224, 1895, "*Notheia* Bail. et Harv. [1855] in Hook. Fl. of New Zeal. II, p. 215 et Botany of Wilke's Expedition (ined.)" These should now read Harvey & Bailey [1851] in Proc. Boston Soc. Nat. Hist., Vol. III, p. 371 & p. 373.

It may be of interest to note that specimens of many of the species, some of them evidently the individuals from which the plates were drawn, are in the herbarium of Brown University, Providence, Rhode Island, where Professor W. W. Bailey, son of J. W. Bailey, was for many years at the head of the department of botany.

When we look up the history of the whole work, the element of uncertainty and inconsistency that we found as to the paper on algae is still noticeable. The Act of Congress authorizing the work, under date of Aug. 26, 1846, provides for a series of volumes similar to those of the Voyage of the Astrolabe, to be issued in 100 copies, and distributed as follows: — one copy each to Captains Wilkes, Hudson and Ringgold, one to the Library of Congress, one to the Naval Lyceum at Brooklyn, one to each State of the Union, one to each friendly foreign power, and one additional copy each to France and Great Britain. The number of states increased during the period

from 1846 to 1874; whether the number of friendly foreign powers increased or decreased during this time, I have no idea; in any case the number available for general distribution must have been exceedingly small. In a communication from the Librarian of Congress, whose kindness in furnishing me important data in regard to the matter I gratefully acknowledge, is a statement which incidentally shows what might have been thus available, and at the same time shows that probably none were really available. A fire at Washington, April 11, 1856, destroyed about 21 copies of 18 of the volumes then in print, and of those destroyed only the narrative volumes and Vols. VI–VIII of the memoirs were replaced by a new impression. Probably none of the copies authorized by Congress ever reached the general public.

The General Catalogue of Government Publications by B. P. Poore, issued in 1885, at page 500 has a list of the volumes, but the fatality that seems to attach to the whole business extends to this also, and it is incorrect in at least one particular, so that I shall give instead the list made out for me by the Chief Bibliographer of the Library of Congress, adding the author's names, which were given in only a few instances in the list. Vols. I to V, with an atlas, contain the narrative of the expedition, were issued in 1844, and need not be here considered. They seem, however, to have attracted interest, and several editions, some in smaller and less expensive form, were issued soon after by publishing houses.

VI. Philology, Horatio Hale, 1846.

VII. Zoophytes, James D. Dana, 1846, with Atlas, 1849.

VIII. Mammalogy and Ornithology, John Cassin, 1858, with Atlas of same date.

IX. Races of Man and their Geographical Distribution, Charles Pickering, 1848.

X. Geology, James D. Dana, 1849, with Atlas, undated.

XI. Meteorology, Charles Wilkes, 1851.

XII. Mollusca and Shells, Augustus A. Gould, 1852, with Atlas, 1856.

XIII. Crustacea, Part 1, James D. Dana, 1852.

XIV. Crustacea, Part 2, James D. Dana, 1853, with Atlas, 1855.

XV. Botany, Part 1, Asa Gray, 1854, with Atlas, 1856.

XVI. Botany, Cryptogamia, William D. Brackenridge, 1854, with Atlas, 1855.

XVII. Botany (author's name not on title), 1862–1874, with Atlas, no title page.

XVIII. Botany, never published.

XIX. Geographical Distribution of Animals and Plants, Charles Pickering. In signatures, Boston, 1854.

XX. Herpetology, Charles Girard, 1858, with Atlas, same date.

XXI & XXII, Ichthyology, never published.

XXIII. Hydrography, Charles Wilkes, 1861, with two Atlas volumes, both 1858.

XXIV. Physics, never published.

This is the list of what we may call the official set, the 100 copies authorized by Congress; the volumes are sumptuously bound in full morocco, with elaborate ornaments stamped in gilt, eagles, sunbursts etc. The Massachusetts set can be seen in the State Library in the State House in Boston; it has all the volumes issued with the exception of Vols. XVII & XIX. The printed catalogs of the State Libraries of Ohio and California show very nearly the same, and the Rhode Island set, deposited with the Rhode Island Historical Society, is similar. I have not looked up other state sets, but it may fairly be assumed that they are nearly the same.

Soon after the work was authorized by Congress, protests came in from scientific and other societies against the limitation of the edition, providing no copies whatever for institutions or the public.[1] These were referred to the Joint Committee on the Library of Congress, which reported[2] recommending 400 additional copies, 285 to be distributed to institutions in the country, the remainder to be sold to the public. Congress ordered 5000 copies of this report to be printed, and then paid no further attention to it. Somewhat grudgingly, authors were permitted to have additional copies printed at their own expense, and this was taken advantage of to a varying extent by different authors; copies so issued are what one finds in various public and scientific libraries. When not rebound, they are in the ordinary black cloth of government publications of the period. Of Vol. VI there appear to have been printed 150 such copies, the responsibility being taken by the firm of Lea & Blanchard of Philadelphia. I do not think that over 100 copies were printed in this way of any other volume, and of some the number was less; in one or two

[1] See Cong. Doc., Vol. 476, No. 327; Vol. 533, No. 57 etc.

[2] Cong. Doc., Vol. 477, No. 405.

instances I cannot find that any extra copies were printed at all. The volumes of the official edition had no publisher's name on the title page, but only "Printed by C. Sherman, Philadelphia" or a similar form. Some of the copies of the public edition are the same, but others have various imprints. In most but not in all cases, the reverse of the title has "Printed by C. Sherman" or some form similar. These volumes were generally placed by the authors in the hands of some publisher, whose name appears on the title; sometimes the work was transferred from one publisher to another, and another title used. Being sold individually, volume numbers were often omitted, which was not unnatural, but it is not so easy to understand why in some cases a different volume number from that of the official edition should be used.

I have drawn up a list of these variations from the official set, in the copies I have examined in the libraries of Boston and Cambridge; it is probable that copies in other places will show additional variations. For the convenience of any one who may wish to inspect any particular form, I use initials to indicate the library, as follows:—BPL, Boston Public Library. NH, Boston Society of Natural History. BA, Boston Athenaeum. GH, Gray Herbarium. MHS, Massachusetts Horticultural Society. MCZ, Museum of Comparative Zoology.

Vol. VI. No volume number on title or back; BA, BPL. No volume number on title, Vol. VII on back; BPL, Barton Library.

Vol. VII. No volume number on title, Vol. VIII on back, Philadelphia, Lea & Blanchard, 1848; BPL, NH. The BPL copy has a slip bound in before the false title, dated December, 1847, and announcing the atlas, to be ready in the course of 1848.

Atlas to Vol. VII. Philadelphia, C. Sherman, Printer, 1849; BPL. Philadelphia, Lea & Blanchard, 1846; MCZ. Philadelphia, Lea & Blanchard, 1849; NH, BPL, Barton Library.

Vol. VIII. Philadelphia, J. B. Lippincott & Co., 1858, no volume number on title or back; NH. Two title pages, J. B. Lippincott & Co. on first, Vol. VIII; second title with no volume number, 1858, no volume number on back; BPL, MCZ.

Atlas to Vol. VIII. Philadelphia, J. B. Lippincott & Co., 1858; NH, BA, BPL, MCZ.

Vol. IX. Boston, Charles C. Little and James Brown, 1848; NH. Boston, Charles C. Little & James Brown. London, John Murray; 50 Albemarle St., 1858; BPL, two copies.

Vol. X. No date on title, no volume number on title or back, New York, G. P. Putnam; BA. No date on title, no volume number on title or back, New York, G. P. Putnam, 155 Broadway; London, Putnam's American Agency, 49 Bow Lane, Cheapside; MCZ.

Atlas to Vol. X. No date or volume number. New York, G. P. Putnam; BA. No date or volume number, New York, G. P. Putnam, 155 Broadway; London, Putnam's American Agency, 49 Bow Lane, Cheapside; BPL.

Vol. XI. Introduction, pp. (V)–LVIII, 25 diagrams. A printed slip is bound in at the title, signed "The author," stating that a few copies were printed for his friends; MCZ. I cannot find that the text of this volume was issued in other than the official set.

Vol. XII. Boston, Gould & Lincoln, 1852; BA, BPL. Boston, Gould & Lincoln, 1852, with 10 pages (*500–*509) "Addenda et Corrigenda" with date of May 20, 1854, bound in after the index, which ends with p. 510; original binding; N.H. The Massachusetts official copy and the Barton copy in BPL are like the BA copy, and have the additional 10 pages as a separate pamphlet.

Vol. XIII. Vol. XIII, part 1 on back, BPL, MCZ.

Vol. XIV. Title Vol. XIII, part 2, 1852; NH. Title and back, Vol. XIII, part 2, 1852; BPL, MCZ.

Atlas to Vols. XIII & XIV. NH, MCZ, BPL 2 copies, all like official.

Vol. XV. No volume number, New York, G. P. Putnam & Co.; BA, NH. No volume number, Philadelphia, printed by C. Sherman; GH. Vol. 14 on back, New York, G. P. Putnam & Co.; BPL.

Atlas to Vol. XV. No volume number, New York, G. P. Putnam & Co., Publishers, 1857; NH, GH, BPL, 2 copies.

Vol. XVI and Atlas. GH, BPL, like official.

Vol. XX. No volume number on title or back, Philadelphia, J. B. Lippincott & Co.; NH, BPL. The official copy has on the title "Prepared under the superintendence of S. F. Baird" which does not appear on the NH and BPL copies.

Atlas to Vol. XX. Philadelphia, J. B. Lippincott & Co.; NH, BA, BPL.

Of Vol. XXII and its two atlas volumes I have seen only the official copy.

The government catalog gives Vol. VIII by Cassin, but there was

an earlier Vol. VIII by Titian R. Peale. The official set has this as Vol. VIII, part 1, the Cassin volume being part 2. Peale was with the expedition in charge of the department of Birds and Mammals, and on his return prepared the plates and wrote the volumes of text. This was printed and distributed to the states and presumably to the foreign powers. Wilkes, who had taken on the superintendence of the publications, was dissatisfied with Peale's work, and arranged with Cassin to prepare a new volume in place of it. The copies which had been distributed were not recalled, but all remaining copies appear to have been destroyed, including the copy of the Library of Congress, which lacks this volume. I cannot find that any author's copies were printed, and it must be considered one of the rarest of scientific works. Some good ornithologists, to whom I wrote inquiring about it, had never heard of it. Two ornithologists, both of high authority, knew it; one writes me that the 100 or more new species described in it were properly reduced by Cassin to about 30; the other writes me that Cassin severely condemned Peale's descriptions, but modern ornithologists consider Cassin's descriptions little better.

The rarest of the botanical works is probably the Atlas to Vol. XVII, Ferns etc. by Brackenridge, but the reason for this rarity I do not know. Vol. XV, Phanerogamia, is sometimes found without the Atlas, and vice versa. Sabin,[1] states that by some mistake a large part of the edition of the plates was sold at auction, unbound, without the text. I can find no details as to this, but one copy of the Atlas in the Boston Public Library was presented by Leonard & Co., January 5, 1858. Leonard & Co. were leading book auctioneers in Boston for many years, and may have made the sale referred to.

To explain the non-publication of Vols. XVIII, XXI, XXII and XXIV would take much space and would bring up interesting but not specially edifying stories of inefficiency, extravagance and plunder, which when compared with present conditions, indicate that the standards in such matters are higher now than in the days of the fathers.[2] At the time the publication was authorized there was no National Museum, no Smithsonian Institution, practically no organ that could deal with scientific matters; Congress, probably with a vague feeling that literature had something to do with science, and

[1] Books relating to America, Vol. VII, p. 395.

[2] Details of dissensions following the expedition, and reports on manner of publishing will be found in Cong. Doc., Vol. 494, No. 47, Vol. 495, No. 217, Vol. 994, No. 391 and Vol. 1667, No. 60.

that a library had something to do with literature, put the matter in charge of the Joint Committee on the Library of Congress, with which it remained from 1852 to 1874, the date of the last issue. The committee, its membership continually changing, left the whole matter practically in the charge of Wilkes, who dealt with authors and printers much as he was accustomed to do with sailors and marines. The qualities that made him an excellent commander of an exploring expedition, accomplishing a work of lasting credit to the navy and the nation [1] were not suited to estimating the value of scientific memoirs. We have already seen how Peale's memoir was treated by him. William Rich, the botanist of the expedition,[2] prepared a volume on botany, which was never printed; Louis Agassiz two volumes on ichthyology, Gray a second volume on botany; the manuscripts of these are probably somewhere in Washington; but of course the long time since they were written would make their publication out of the question now. The Library of Congress claims to have a volume, without title, of the plates prepared for Agassiz's memoir. If printed at all, no doubt the 100 copies were printed, but the Museum of Comparative Zoology, Agassiz's own Museum, knows nothing of them.[3]

There is no evidence of anything dishonest on the part of Wilkes himself but the report of the Library Committee in 1876 [4] shows that the greater part of the money appropriated, about $350,000.00 in all, had gone for "superintendents," the amounts for the work itself being in some years absurdly small. The disgust of Congress at these

[1] Dana, who had plenty of reasons to be dissatisfied with him as regards the publication, calls him "An excellent officer"; "Perhaps no better could have been found in the navy at that time." For a very good account of the voyage from a scientist's point of view, as well as of the curiously annoying restrictions Wilkes attempted to impose on the authors of the memoirs, see The Life of James Dwight Dana, Scientific Explorer, Mineralogists, Geologist, Zoologist, Professor in Yale University, by Daniel C. Gilman, President of Johns Hopkins University. New York & London, Harper & Bros., 1899. An indication of the change of conditions in the past 60 years is shown by Dana's comment on the one particular restriction that seems to have made him lose his temper, the ruling that the work should be done at Washington. "The absurdity of writing a scientific memoir in a city without books!"

[2] The botanist of the expedition was to have been Dr. Gray, who was regularly appointed and drew advance pay. For some reason he decided not to go. Interesting letters in regard to this are included in the volume of letters by Jane Loring Gray, Boston, 1893.

[3] The payments to the authors were liberal; according to the report of the Library Committee, Cong. Doc., Vol. 994, No. 391, such payments on the rejected or neglected volumes were Rich, $4,560.00; Gray, $3,000.00; Agassiz, $5,916.66.

[4] Cong. Doc., Vol. 1667, No. 60.

revelations led to an immediate stoppage of the work, without regard to the memoirs ready and waiting. The money sufficient to publish them had been appropriated over and over again but had been squandered.

My interest in the matter began with some references to Vol. XVII, and this volume deserves still further notice. Its fate was in some ways the most peculiar of all. This volume was intended to include the cellular cryptogams, as well as the phanerogams of the Pacific coast of the United States, the latter part having been assigned to Dr. John Torrey. His report was ready in 1861, but had not been published at the time of his death. Dr. Asa Gray added some notes, and in a short preface dated Washington, April 15, 1873, explained his relation to Dr. Torrey's work, and to some extent the circumstances of the twelve years delay since it was written. The lichens by Tuckerman, pp. 113–152, Algae by Bailey & Harvey, pp. 153–191, Fungi by M. A. Curtis & M. J. Berkeley, pp. 193–203, and the Torrey-Gray section, pp. 305–514, were issued in 1874, the title page bearing the double date 1862–1874. A note states that pp. 113–203 with the plates belonging to them and also the 17 plates of the Torrey-Gray section, were printed in 1862, and a small number of copies distributed. I have never seen one of these copies, nor has any of my botanical friends, and I have not found them mentioned in any catalog. Pp. 1–112 were assigned to the Musci, by W. S. Sullivant, but he apparently became tired of waiting for their publication by the government, and in 1859 issued an imperial folio atlas of 26 plates with 32 pages of text, corresponding to the missing pp. 1–112 of Vol. XVII. There is a copy of this at the Gray Herbarium. All the copies I have seen of Vol. XVII appear to be of the public or author's edition, the Gray Herbarium had the supply of these and of the Sullivant folio, but I believe they are now all sold. Some copies have the plates in a separate atlas volume, the same as the plates of the other memoirs in the series; more commonly the plates are folded, mounted on guards and bound with the text. No complete copy of the volume, with pp. 1–514, has been seen by me, but Dr. H. H. Bartlett was so kind as to look up at my request the copy in the Library of Congress; he reports it as complete, with a title page dated 1874, giving full statement of the contents; it has the full morocco binding of the official set. It is evident then that the whole volume was officially printed, but it was never distributed to the states, nor presumably

to the foreign powers. It is to be hoped that some one with influence enough to overcome the official inertia will have the missing ninety and nine brought forth from their hiding, and sent to their destinations.

As to Vol. XIX, the other one missing in the Massachusetts set, all the copies I have seen are of the public issue, and bear different publishers names, though all printed by C. Sherman. It is not likely that Sherman printed copies for the author but not for the government; probably the 100 copies of this volume might be unearthed in Washington by one who had time and energy for the work.[1]

The insufficient supply of these memoirs has been reduced below the original amount by fires, the loss in this way having been unusually heavy. I have already referred to the fire at Washington. There were losses in two fires at Philadelphia near that time, so that the official edition of most of the memoirs was reduced to about 70. Dana's volume on zoophytes was an exceptional sufferer; the original colored drawings were lost in one of the Philadelphia fires; most of the type specimens in the Chicago fire; and at two times, a fire at New Haven destroyed some of his own extra copies, the second fire taking all that was left. In ascertaining whether any other states had sets like that of Massachusetts, I have written to the State Librarians of Rhode Island, New York and Minnesota; of these the last two report that they had sets, but that they had been destroyed in conflagrations. It is not likely that the proportion is the same among the other states; but one cannot tell what a thorough round-up might show.

Malden, Massachusetts.

[1] In this connection see Cong. Doc. Vol. 994, No. 391, Report of the Committee on the Library on progress of publication. Under date of March 2, 1859, they say of Vol. XIX, ms. ready; maps made. The Boston Public Library copy has the signature of Theodore Parker with the date March 2, 1854. Other copies have title pages with dates varying from 1854 to 1863.

AN EARLY COLLECTION OF SALIX BALSAMIFERA.

M. L. Fernald.

On referring to the discussion of *Salix balsamifera* Barratt in Sargent's *Silva,* the writer recently noticed a statement which, by frequent repetition, has come to be strongly associated with the history of our knowledge of this unique species. The statement referred to:—"*Salix balsamifera* was first collected by Mr. Henry Little in August, 1823, on the bank of the Ammonoosuc River among the White Mountains of New Hampshire"[1]— originated with the late M. S. Bebb in 1879. At that time Bebb called attention[2] to Mr. Little's specimen preserved in the herbarium of the Academy of Natural Sciences of Philadelphia; but, although the type material of the species which is botanically of the greatest importance was collected by Sir John Richardson from "Lake Winnipeg and the Saskatchawan,"[3] Mr. Little's earlier and long-overlooked collection of *S. balsamifera* has received such unusual prominence in the past third of a century as "the oldest herbarium specimen extant"[4] of the species that it is appropriate, for the sake of historical accuracy, to record a still earlier collection of this willow. And, just as the Little specimen of *S. balsamifera* lay in a public herbarium unrecognized and unrecorded for more than half a century, it is perhaps noteworthy that the earlier-discovered but heretofore unrecorded specimen was collected 120 years ago and until 1903 lay apparently unnoticed (at least undetermined) in the herbarium of the Muséum d'Histoire Naturelle at Paris.

In 1903 while examining the plants in the Michaux Herbarium the writer was interested to find this sheet of very characteristic foliage of *Salix balsamifera* bearing in Michaux's hand the label: "dans les marais de Batiscan." The species, presumably because represented

[1] Sargent, Silva, xiv. 64 (1902).

[2] Bebb, Bot. Gaz. iv. 190 (1879).

[3] Hook. Fl. Bor.-Am. ii. 149 (1839).

[4] "Here we have, I doubt not, the oldest herbarium specimen extant of *S. balsamifera*"— Bebb, Bull. Torr. Bot. Cl. xv. 122 (1888). "It was first discovered more than half a century ago among the White Mountains of New Hampshire"— *J.*, Garden and Forest, i. 246 (1888). "This fragmentary specimen he [Bebb] recognized as Salix balsamifera and realized that it was the earliest collection of the species."— Sargent, Garden and Forest, vi. 28 (1893).

only by foliage, was not described in Michaux's *Flora Boreali-Americana*, and in the herbarium the sheet had been left among the unnamed specimens following those which formed the basis for the *Flora*. The label, "in the bogs of Batiscan," gives the desired clue to the date of collection, for on the 14th of July, 1792, Michaux botanized in the bogs at Batiscan (in Champlain Co., Quebec) and there collected some very characteristic bog plants. His journal of that date reads: "Le 14 herborisé a 8 li. de distance des Trois Riv. dit Batiscan; plus bas Andromeda polifolia, Kalmia glauca, angustifolia; Azalea glauca [?], Ledum palustre [groenlandicum], Comarum. . . ."[1] Whether or not Michaux's material of *Salix balsamifera* gathered in 1792 is the earliest collection of the species, which is not improbable (although this willow is common in eastern Newfoundland and various regions of eastern Canada whence early collections of plants were carried to Europe), it is obvious that his material was collected thirty-one years earlier than Little's specimen from the White Mountains, the specimen which has so often been cited as the earliest collection of the species.

Gray Herbarium.

Bowman's Forest Physiography.[2] — Although written primarily for foresters and students of forestry, Professor Bowman's book will find an interested circle of readers among students of plant-geography, for in it are stated in clear and readable style the general physiographic features of the United States, with discussions of soils and climatic conditions, and much other matter which bears directly upon the distribution, not only of forests, but of other plants as well. The field-botanists whose interests lead them to the boundaries of physiography and geology are constantly in need of authoritative information upon these allied subjects and by them Bowman's *Forest Physiography* will be heartily welcomed.— M. L. F.

[1] Journal of André Michaux, 1787–1796, ed. C. S. Sargent (Proc. Am. Phil. Soc. xxvi. no. 129) p. 72 (1888).

[2] Forest Physiography. Physiography of the United States and Principles of Soils in Relation to Forestry, by Isaiah Bowman, Ph.D. 8vo. xxii–759 pp. 292 figs. and 6 plates. Cloth, $5.00 net. New York. John Wiley & Sons.

FIELD EXCURSIONS OF THE NEW ENGLAND BOTANICAL CLUB.[1]

As a result of the first field day of the New England Botanical Club, centering about Providence, Rhode Island, on May 30, 1911, the collections of the Club gained more than 800 specimens and several species not previously known from Rhode Island. This pioneer experiment of the members of the Club in making a concerted effort to develop the Club Herbarium was considered a great success, and the experience of last year justifies the continuance of such field days. The importance of such outings cannot be over-estimated, for not only does the Club Herbarium gain materially but the members have an unusual opportunity for congenial field-trips and exchange of experiences.

And now that the Club is so soon to have commodious quarters with fireproof cases and other up-to-date facilities for the development of its Herbarium, the ideal toward which we have been modestly working can be more readily accomplished. As already known to some members of the Club, the aim of our Curators has been to make our Herbarium thoroughly representative of the flora of New England: a collection which shall show the distribution of each species and variety in such detail that from it it will be possible to work out with exactness the natural floral areas of the region. No such herbarium for an extensive area exists in America and no such exhaustive study of a large area has been undertaken with us, but in some parts of Europe very gratifying results have been achieved, and in Great Britain the renewal of interest in such work, already well started by H. C. Watson and two Botanical Exchange Clubs, has recently become very obvious under the leadership of Dr. C. E. Moss of Cambridge University. There is no theoretical reason why we in New England should not bring together such a collection as suggested above; and when this aim is accomplished we shall be in a position to draw from our collections conclusions upon questions of plant-distribution which will be of far-reaching importance. It is too soon to outline with anything but the crudest approximation natural floral areas within our limits; such large districts as the Cape Cod region, the Housatonic Valley, the White Mountains, the eastern coast of Maine, etc. are known in a general way, but we certainly

[1] Communicated by the Committee on Field Excursions at the meeting of March 1, 1912.

have not the data by which to determine the exact limits of distribution on Cape Cod, for instance, of *Lespedeza angustifolia* or *Panicum oricola*; in the Housatonic Valley of *Salix serissima* or *Carex Crawei*; in the White Mountains of *Osmorhiza divaricata* or *Lycopodium sitchense*; or in eastern Maine of *Montia lamprosperma* or *Comandra livida*.

Every member of the New England Botanical Club who has aided in the preparation even of Check Lists by states, and all who have taken part in the more detailed work of the Committee on Local Flora realize how lamentably inadequate is the available material in both public and private herbaria; and all of us are cognizant of the constant and too often fruitless appeals from our corps of untiring workers for more data and specimens and for any information whatever from certain regions.

At the last accounting, May 31, 1911, the organized part of the Club Herbarium comprised, besides an encouraging start in Algae, Lichens, Mosses and Hepatics, 43,403 sheets of vascular plants. This figure at first appears large and it might seem that a collection of such proportions is ample for our needs. In fact we might be pardoned for congratulating ourselves upon the vastness of our possessions: the herbarium of the Middlesex Institute, the herbarium of the Metropolitan Park Commission, the private herbarium of the late Herbert A. Young, the Maine collections of F. Lamson Scribner, Elmer D. Merrill, Fred P. Briggs, Miss Kate Furbish and M. L. Fernald; the Berkshire County collections of Ralph Hoffmann, the Marthas Vineyard herbarium of Sidney Harris, and innumerable other collections, including the invaluable New England herbarium of Bryophytes and Lichens of Charles E. Faxon. But valuable as the Club Herbarium has already become, an analysis of its components shows that our present collections are merely a nucleus, about 8 %, in fact, of the material required for an adequate representation of the plants of the six New England states.

In the following analysis of the situation column A gives by states the number of mounted sheets of vascular plants in the herbarium on May 31, 1911; column B, the areas of the states; column C, the number of species and varieties of flowering plants and ferns known in each state; column D, the approximate number of species generally distributed in the state; column E, the approximate number of species of local occurrence in the state; column F, the approximate number of species in each area of 100 square miles; and column G, the approxi-

mate number of sheets the herbarium *should* contain adequately to display the vascular flora of New England. Properly to embody the element of distribution in our calculations the ratio of one specimen of each species to every 100 square miles of area has been used: the figure is entirely arbitrary but has seemed to your committee a conservative one. The figures given in column F are derived as follows from those of columns D and E. The plants represented by the figures in column E are of varying degrees of restriction. For instance, for Massachusetts such plants as the following have been included in this column: *Desmodium grandiflorum,* widely and almost generally distributed but unknown in the more silicious southeastern areas; *Senecio obovatus,* frequent in the western third of the state but rare eastward; *Betula nigra,* known only from the northeastern section; *Solidago macrophylla,* known only from Mt. Greylock; and obviously all plants of strictly coastal habitats. After considerable tabulation it has seemed reasonable to estimate that the plants of column E, the "local" plants, are found on the average over one tenth of the state. The figures in column F are, then, derived roughly by adding the figures in column D to those in column E divided by 10. In determining the number of species in columns D, E, and F one striking fact, which might readily be overlooked, has been clearly brought out: namely, that the larger the state or the more diverse its conditions the smaller the number of generally distributed species and the greater the number of local plants. Thus our largest state, Maine, with its fertile limestone Aroostook region, its alpine summits, and its sterile silicious southern counties, has only 604 generally distributed species (and the figure may prove too large) while, judging from the statements of ranges given in Brainerd, Jones and Eggleston's *Flora of Vermont* that smaller but more uniform state has about 950 generally distributed species.

	A		B		C	D	E	F	G	
State	No. of specimens in the herbarium	%	Total area in square miles	%	Number of species known	Species generally distributed	Species local	Approximate no. of species in each area of 100 sq. mi.	Approximate no. of specimens needed	%
Maine	21,937	50	33,040	50	2,100	604	1,496	750	248,000	47
New Hampshire	2,599	6	9,305	14	1,720	640	1,080	750	70,000	13
Vermont	2,071	5	9,565	14	1,724	954	770	1,000	96,000	18
Massachusetts	13,715	32	8,315	13	2,445	448	1,997	650	54,000	10
Rhode Island	802	2	1,250	2	1,670	650	1,020	750	10,000	2
Connecticut	2,279	5	4,990	7	2,228	868	1,360	1,000	50,000	10
Total	43,403	100	66,465	100					528,000	100

The table shows conclusively that our attempt to form a representative herbarium is only just begun and that a vast amount of collecting must be done in every state before our collections can be considered in any sense adequate. Massachusetts with a credit of 32 % of present material occupies the best position technically, while Maine, with 50 %, is nearly normal in relation to our desideratum of 47 %. From New Hampshire we have only 2599 specimens, comprising but 6 % of our present total. This is less than two specimens of each species known to occur in the state and obviously can show nothing more detailed than the fact that these plants are found in New Hampshire. Vermont is in an even less enviable position, but Rhode Island, our smallest state, is up to standard with its 2 %, although we have mounted and available only 802 sheets while more than twice that number of species have been observed in the state. Connecticut, too, needs our energetic attention. The flora of the state is unusually well worked out by the Connecticut Botanical Society but we have from Connecticut barely as many specimens as there are species known to occur in the state.

Obviously, those who are interested in this practical work of the Club must now begin active collecting for the Club Herbarium. The need is apparent; the facilities for the proper care of the collections have never been equalled. It is the opinion of your committee that one of the most effective ways of obtaining representative material in quantity for the herbarium is by means of field days in which many members of the Club will participate.

The second field trip of the Club — only the first of many in 1912 it is hoped — will be on Saturday, May 11, with a center at Greenfield, Massachusetts. The party will leave Boston (North Station) at 6.19 P. M. on Friday reaching Greenfield (106 miles from Boston) at 9.23. As on the Rhode Island trip the party will be divided into teams of two and each team assigned a certain district for exploration on Saturday. At 7 P. M. all will meet for dinner and will spend the evening in discussion of the afternoon's results. Those who wish can return to Boston on Sunday morning (leave Greenfield at 7.10 A. M., arrive at Boston at 10.25); those who care to spend more time afield can wait until an afternoon train and will find many attractive regions made available by the different railroad and trolley lines centering at Greenfield — the valleys of the Connecticut, Green, Deerfield, and Miller's Rivers, the trap ridges of central Massachusetts and the southern corners of New Hampshire and Vermont.

Although in our backward and sterile coastal areas there is little good botanizing as early as May 11, the experience of those who have been in the Greenfield region at that date justifies us in announcing that the following, besides many less attractive species, are in flower or fruit early in May: *Equisetum pratense, Cryptogamma Stelleri, Carex plantaginea, Luzula saltuensis, Alnus mollis, Asarum canadense, Clematis verticillaris, Hepatica acutiloba, Caulophyllum thalictroides, Dicentra canadensis* and *D. Cucullaria, Dentaria laciniata* and *D. diphylla, Mitella diphylla, Waldsteinia fragarioides, Dirca palustris, Lonicera canadensis, Viburnum alnifolium* and *Tussilago Farfara.* What more could be asked by the man weary of city life and longing for a real taste of spring?

As above stated the practice of last year will be continued of dividing the party into several squads operating independently within different areas. By this means much more can be accomplished than if the entire party goes to one place. More territory can be explored and the number of plants collected increased as many times as there are parties. Every plant in recognizable condition (whether lichen, moss, fern or flowering plant), especially the common things, should be taken (whether in flower or not). It is not necessary that the collectors determine the material. All that is asked is that each party make as complete a collection as possible in the region assigned keeping mental note of habitats and relative abundance and after pressing and drying the plants send them to the curators accompanied by labels (which the Curators will supply) with a record of habitat and relative abundance.

Here is a grand opportunity for every member to show his loyalty to the Club and his zeal for field-work. Let each of us, then, consider the excursions personal obligations and at comparatively small cost or inconvenience join this undertaking and enjoy a trip afield when Nature most invites us, and at the same time be of practical service to the Club in building up the collections upon which our detailed studies must inevitably depend.

The expense of the Greenfield trip for those who stay through Saturday and Sunday will be well under $10.00.

Members owning automobiles can render invaluable service by placing their cars at the disposal of the Committee. Several machines can be used to advantage.

The committee desires to know as early as possible how many are

specially interested in the Greenfield field excursions. Will those who plan to attend kindly *notify the chairman before April 15?*

A detailed announcement of trains, hotel arrangements, etc., will be issued later.

If the Greenfield trip proves satisfactory other similar outings will be arranged.

C. H. Knowlton,
Hingham, Mass.
M. L. Fernald
F. G. Floyd

Committee on Field Excursions.

The New England Federation of Natural History Societies will hold its annual meeting Friday and Saturday, April 26 and 27, at the building of the Boston Society of Natural History. The exhibition will be open both days and there will be sessions Friday evening and Saturday morning.— J. H. Emerton.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XIV.

CYPERACEAE.

CAREX, L. TO N.

C. lanuginosa Michx. Swamps and low meadows, common.

C. laxiculmis Schwein. Rich damp woods; occasional near Boston, also found in West Newbury and Andover.

C. laxiculmis Schwein., var. **copulata** (Bailey) Fernald. Haycock Meadow, Medford (*Wm. Boott*, July 5, 1853).

C. laxiflora Lam. Rich woods and meadows; well distributed throughout, but not very common.

C. laxiflora Lam., var. **blanda** (Dewey) Boott. Abundant near Boston, also collected at Framingham; West Newbury, according to Robinson, Fl. Essex Co., 120, 180.

C. laxiflora Lam., var. **gracillima** Boott. Low woods, Cambridge (*M. L. Fernald,* June 10, 1891).

[C. LAXIFLORA Lam., var. LATIFOLIA Boott. There have been several reports of this variety from the district, but all the specimens so named which the committee has examined prove to be vars. *patulifolia* or *varians.* Var. *latifolia* apparently reaches its eastern limit in western New England.]

C. laxiflora Lam., var. **leptonervia** Fernald. Swampy woods, Boxford (*J. A. Cushman,* June 7, 1907); Waverly [Belmont] (*Wm. Boott,* June 9, 1861).

C. laxiflora Lam., var. **patulifolia** (Dewey) Carey. Well distributed.

C. laxiflora Lam., var. **varians** Bailey. Occasional near Boston (12 stations).

C. lenticularis Michx. Merrimac River, Dracut and Lowell (*C. W. Swan,* July 20, 1882).

C. LEPORINA L. Dry soil chiefly of pastures or roadsides; Long Island, Boston Harbor (*Wm. Boott,* July 6, 1871 and July 1, 1873, earliest reports); also West Newbury, Wenham, Lynnfield, Lexington, Hyde Park, Norwood, Dover, Framingham.

C. leptalea Wahlenb. Wet woods, meadows and bogs; well distributed throughout.

C. limosa L. "In a pond," Tewksbury (*B. D. Greene,* prior to 1836 — see Fernald, RHODORA, xiii. 246, 247); wet sphagnum bog, west side of Long Pond, Tewksbury (*Wm. Boott,* July 8, 1863, *M. L. Fernald & F. F. Forbes,* June 17, 1911); boggy shore, rather plenty, Sucker Pond, Framingham (*A. J. Eames,* May 29, 1908, and Aug. 5, 1911); bog by Ponkapaug Pond, Canton (*J. R. Churchill, W. Deane, G. G. Kennedy & E. F. Williams,* May 26, 1894).

C. livida (Wahlenb.) Willd. Boxford (*E. & C. E. Faxon,* June 20, 1878 and May 8, 1889); *Salix candida* swamp, Boxford (*J. Robinson,* May 30, 1890); calcareous meadows, Lynnfield (*M. L. Fernald,* June 16, 1907); Essex Co. (*Wm. Oakes,* no date).

C. lupulina Muhl. Wet places, common.

C. lupulina Muhl. var. **pedunculata** Dewey. Frequent throughout.

C. lupulina Muhl. × **lurida** Wahlenb. Medford Branch R. R. (*Wm. Boott,* July 15, 1866).

C. lupulina Muhl. × ?. Near North Braintree (W. P. Wilson,

August, 1877); West Quincy (J. R. Churchill, July 11, 1891). The above specimens seem to show traces of *Carex retrorsa* Schwein., but, as that species is unknown in this vicinity, it is not safe to pronounce upon the hybrid.

C. lurida Wahlenb. Wet places, very common throughout.

C. maritima O. F. Mueller. Brackish shores and salt-marshes, rare; Newburyport, Salem, Medford, Arlington, Cambridge.

C. mirabilis Dewey. Fields and open woods; well distributed in northern two thirds of district, but not reported elsewhere.

C. mirabilis Dewey, var. **perlonga** Fernald. Wilmington, Revere, Stoneham, Boston, Cambridge, Waltham, Norfolk.

C. Muhlenbergii Schkuhr. Dry sterile soil, common.

C. Muhlenbergii Schkuhr, var. **enervis** Boott. Malden, West Roxbury, Dover, Wellesley, Framingham, Milton.

C. MURICATA L. Dry fields and roadsides; abundant near Boston and Salem, also at West Newbury, Wayland and Holbrook.

C. novae-angliae Schwein. Moist open woods, rare; Billerica (*C. W. Jenks & C. W. Swan*, July 18, 1890); Purgatory Swamp,[1] Norwood (*Wm. Boott*, July 10, 1861; *C. H. Knowlton*, May 18, 1910); Blue Hills, Milton (*Wm. Boott*, June 3, 1870; *G. G. Kennedy*, June 15, 1899).

C. H. KNOWLTON, J. A. CUSHMAN, WALTER DEANE — *Committee on Local Flora.*

TWO LOCAL FLORAS.— We have received two local floras which are of special interest to New England botanists. Mrs. Flynn's *Flora of Burlington and Vicinity*[2] is a list of the vascular plants growing without cultivation about Burlington, Vermont. The flora is a large one, 1240 species, and to those who know only the upland country of Vermont a particularly interesting one from the large number of

[1] Purgatory Swamp has been located by various collectors in Dedham, Westwood and Norwood. The committee has located it in Norwood, until RHODORA XIII, 233–4, when by some misunderstanding it was accredited to Westwood. To settle the point once and for all, the town authorities of Norwood were consulted, and it was found that the property paid taxes in Norwood. Everett Street, which runs from Ellis Station to the Neponset River and on to Canton Corner, is in general the line between Westwood and Norwood. Small portions of Westwood lie south of this street, but the rich woods, the spring, brook, and swamp, are in Norwood.

[2] Flora of Burlington and Vicinity. A list of the Fern and Seed Plants growing without Cultivation, by Nellie F. Flynn (Contributions to the Botany of Vermont, IX). Burlington, Vt. 1911. 8vo. 124 pp.

coastal plain species which are localized on the sandy soil near Lake Champlain:— such species as *Woodwardia virginica, Pinus rigida, Polygonella articulata, Lupinus perennis, Polygala polygama, Bartonia virginica, Asclepias amplexicaulis, Artemisia caudata,* etc. In general style and typography the *Flora of Burlington* follows the Vermont Botanical Club's well known *Flora of Vermont* and like it represents intimate knowledge of the region covered.

In 1860 Hervey's *Plants found in New Bedford and its Vicinity* was published, in 1891 it was revised, and now its ever enthusiastic author, undaunted by the passage of fifty-one years since his first publication, brings his work to date as a revised edition of the *Flora of New Bedford and the Shores of Buzzards Bay.*[1] The *Flora* is modeled upon the former editions and happily contains the familiar and always interesting *Procession of the Flowers.* The author is to be congratulated upon the new edition of his standard work and upon a sustained activity which should be an inspiration to all lovers of out-of-door avocations.— M. L. F.

New England Trees in Winter.— The latest handbook of the trees is a practical volume by A. F. Blakeslee and C. D. Jarvis,[2] the text by Dr. Blakeslee, the illustrations by Dr. Jarvis. The keys look as if they would be usable and the plates are good halftones from wonderfully fine photographs showing the winter aspect of the tree, the bark, fruit and buds. In the technical genera only the commoner species are treated — for instance in *Salix* only *S. alba,* var. *vitellina* appears, while the (to most botanists) much more interesting *S. nigra, S. pentandra, S. lucida, S. balsamifera, S. discolor, S. rostrata,* and *S. viminalis* are unmentioned. But, with this omission of the more difficult or local trees understood at the beginning, the book cannot fail to be a popular one — its plates alone will be a delight to every-one who enjoys good illustrations. The body of the text is obviously the result of considerable compilation, the dimensions of the trees and the distribution of the species being "taken with little change from Dame & Brooks' Handbook." The latter book, at the date of its issue in 1901, was our most authoritative source of information on these points; but in view of the activity of New England botanists during the past decade, the reviewer cannot help wondering that an author or compiler in 1911 should ignore the extensions of ranges made since 1901. For instance, with information now available the detailed ranges of *Pinus Banksiana, P. resinosa, P. sylvestris,*

[1] Flora of New Bedford and the Shores of Buzzards Bay with a Procession of the Flowers. Revised edition, by E. W. Hervey. New Bedford, Mass., 1911. 8vo. 137 pp.

[2] New England Trees in Winter by A. F. Blakeslee and C. D. Jarvis. Storrs Agricultural Experiment Station, Bulletin No. 69. Storrs, Connecticut, June, 1911. 8vo. pp. 303–576, plates.

Picea mariana, Betula lenta, Ulmus fulva, Robinia Pseudo-Acacia, Acer Negundo, Tilia americana, Nyssa sylvatica, etc., are much better understood than they were ten years ago.

To those unacquainted with the source of information the statement under the range of the Slippery Elm: "In New England — Maine — District of Maine, rare," will be surprising for the "District of Maine" is not a portion of the state but was the recognized designation of the whole area in colonial days. Dame & Brooks, from whom Blakeslee derived his statement, had said: "Maine,— District of Maine (Michaux, *Sylva of North America*, ed. 1853, III, 53), rare." In the days when Michaux explored eastern America Maine *was* the "District of Maine." But in spite of slips and minor inaccuracies due to the method of preparation of the book it is, as already said, a very attractive volume and one which many New Englanders will be happy to possess.— M. L. F.

Salix serissima in southern Connecticut.— When the remarkable late-fruiting *Salix serissima* (Bailey) Fernald was discussed in Rhodora (vi. 3–8) in 1904 it was known in New England only from swamps of the Stockbridge limestone region of Berkshire County, Massachusetts and Litchfield County, Connecticut; and in the *Catalogue of Flowering Plants and Ferns of Connecticut* (1910) it is recorded only from Norfolk and Salisbury in northern Litchfield County. In the herbarium of the Agricultural Experiment Station at New Haven, however, there is a characteristic specimen (originally labeled *S. lucida*) collected by J. A. Allen in a "swamp near Westville, Ct., June 17, 1880." Westville is in southern New Haven County, very near the band of diabase dikes which extends from the central part of Orange to the eastern part of Woodbridge (see *Geology of Connecticut*, 113), and nearly fifty miles from the other known stations for *Salix serissima*. The occurrence of the shrub at this point suggests the probability that search will reveal it in other swamps near the diabase dikes of Fairfield, Bridgeport, Derby, Orange, Woodbridge, Seymour, Bethany, and Cheshire; for the rock of these dikes is composed of labradorite (a lime-soda feldspar) and pyroxene (containing magnesia, iron, and lime) and should furnish to the neighboring swamps a considerable amount of calcareous soil. The finding of *Salix serissima* at Westville suggests also the desirability of watching for it in swamps which receive drainage from the trap ridges of central Connecticut.— M. L. Fernald, Gray Herbarium.

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THE GEOGRAPHIC ORIGIN OF CRATAEGUS VIRIDIS L.

B. F. Bush.

The authors of the manuals and floras of the Northeastern States, and of works on the trees of North America, as well as the writers in general on Crataegus give as the range of *Crataegus viridis* L. some such expression as, "from Maryland and Virginia to Florida, west to Louisiana, Arkansas and Texas, and up the Mississippi Valley to Saint Louis, Missouri."

It would seem that this claim is ably supported by the presence of an association of over two hundred characteristically southern plants in southeastern Missouri, conspicuous amongst which are *Taxodium distichum, Acer Drummondii, A. Carolinianum, Aesculus austrina, Leitneria Floridana, Arundinaria tecta, Hicoria aquatica, Styrax Americana, Nyssa aquatica, Catalpa speciosa, Planera aquatica, Ilex opaca, Fraxinus profunda, Bradleya macrostachys, Populus heterophylla, Itea Virginica, Quercus lyrata, Q. Phellos, Q. Michauxii, Phoradendron flavescens, Brunnichia cirrhosa, Euonymus Americanus, Gleditsia aquatica, Crataegus Marshallii, Aralia spinosa, Berchemia scandens* and *Liquidambar Styraciflua*, species which have come up the old valley of an ancient sea. That they *have* come up is attested by individuals occurring all the way down this valley to the center of greatest distribution, but that the presence of these two hundred and odd southern species in southeastern Missouri proves that *Crataegus viridis* L., and its congeners, came up the Mississippi Valley, is hereafter to be greatly doubted.

Much has been written of plant distribution, and I am fully aware of the importance of such an association as that indicated in the

preceding paragraph, and reasoning from our knowledge of the inland extension along the Mississippi Valley of so many characteristically southern species, it would on first thought appear that *Crataegus viridis L.* has merely followed in the wake of its southern companions, with which it is so often found in the Southern States.

That any species should ascend the former bed of this ancient inland sea for so great a distance as to Saint Louis, Missouri, without leaving along the path of its invasion a certain number of scattered individuals is scarcely believable; and I will proceed to show the futility of longer believing that *Crataegus viridis* L., and its many forms, came up the Mississippi Valley to Saint Louis, Missouri, and to demonstrate that any species is much more likely to skip large sections of country in going down such a valley.

Having observed and studied *Crataegus viridis* in northern Florida, southern Alabama, southern Mississippi, Louisiana, southern Arkansas and southeastern Texas during the past fifteen years, I have noted that the species inhabits regions of relatively low altitude, sometimes straying to comparatively high ground near by. I have visited many places in northern and northeastern Arkansas, and have collected at Hoxie, Jonesboro, Marked Tree and Paragould in that state, and as far as I have observed the tree, *Crataegus viridis* L. is rare there. In adjacent Missouri I have noted as many as fifteen of twenty trees of this species in Dunklin County, a half dozen or so in Butler County, and the species is quite unknown in Scott, Stoddard, Wayne, Ripley, Carter, Oregon, Shannon, Howell, Texas, Wright, Webster, Greene, Christian, Taney, Stone, Barry and McDonald Counties, a strip reaching from the Mississippi River to the western boundary of the State, where I have done much collecting.

Some eight or ten years ago I found at Webb City and at Joplin, Missouri, a great colony of *Crataegus viridis* or forms of that species, and as this locality is mostly over one thousand feet in altitude, it seemed to me that these forms could not be the true *Crataegus viridis* of Linnaeus, which is a coastal species and inhabits low altitudes. Several years investigations have shown that this great colony of *Virides*[1] extends west into Kansas, southwest into and across Oklahoma, and as far as Llano, Dallas, and Fort Worth, Texas.

That this great colony, which I shall herein designate as the Western

[1] I here use the sectional name *Virides* for *Crataegus viridis* and the many forms which are closely related to it.

Ozark Colony, has anything to do with the great body of Southern *Virides*, which are, as stated above, coastal plants occurring at low altitudes, is highly improbable, as it nowhere joins this southern body of trees and the individuals composing it show a decided preference for high rocky barrens and plains.

In the first part of this paper I have alluded to the well-known fact of plant association and have named about twenty-five trees and shrubs of the two hundred and odd southern species that occur in southeastern Missouri and which are found with the true *Crataegus viridis* of Linnaeus in the Southern States, and I now call attention to the fact that not one of these characteristically southern plants is to be found associated with the Western Ozark Colony, but that the *Crataegus* is here associated with a very different set of plants, of which *Quercus Marylandica, Hicoria villosa, Cornus florida, Viburnum rufidulum, Diospyros Virginiana, Fraxinus Americana, Sassafras variifolium* and *Ulmus fulva* are the most representative, all plants noted for their preference for high, dry and rocky ground.

Some three years ago I visited Hannibal, Missouri, which is some hundred and twenty-five miles north of Saint Louis, the supposed northern limit of *Crataegus viridis* L., and was agreeably surprised to find on the high hills and mounds there several species or forms of *Virides*, quite a colony, and later I saw many acres of trees in the river bottom opposite Hannibal, in Illinois, near the town named Shepherd.

Having quite recently visited Quincy, Illinois, twenty miles north of Hannibal, Missouri, and one hundred and forty-five miles north of Saint Louis, I was further surprised at seeing the hills and mounds around that place covered with *Virides*, many thousands of individuals, some of the trees being the largest specimens I had ever seen. Many of these trees are on the high hills at Keokuk, Iowa, and the forms no doubt occur in all eastern Iowa, and perhaps as far north as southern Wisconsin. There are so many specimens at this colony, which I shall designate as the Upper Mississippi Colony, perhaps one hundred times as many as in all southeastern Missouri and northeastern Arkansas, that it is undoubtedly the center of greatest abundance, and the *Virides* found at Saint Louis, Missouri, instead of coming up the Mississippi Valley, have really straggled down it.

This Upper Mississippi Colony is so far from the great southern body of *Virides*, having not a single southern plant associated with it, that there can be scarcely any doubt that the species composing it are

distinct from the southern species, and as over three hundred miles of forest land and prairie lie between it and the Western Ozark Colony, an area in which no *Virides* have ever been found, it is hardly probable that the species of the two colonies are the same.

To me it is apparent that in some remote time the Western Ozark Colony, as well as the Upper Mississippi Colony, consisted of a few individuals, which have adapted themselves to their surroundings and have continued to multiply until today there are thousands of individuals at each colony differing more or less from each other and from the original members of the colony.

Whether these forms are sufficiently distinct to be called species or varieties is a question which may never be settled, but I am firmly of the opinion that these colonies contain species more or less fixed, species with which I am somewhat familiar and which are as yet undescribed,[1] but which I do not wish here to describe, leaving that to those more capable of drawing their descriptions and determining their relationships.

Having shown that the center of greatest development for *Crataegus viridis* L. is not, as has been so often stated and generally believed, in the Lower Mississippi or Gulf region, but rather in the Upper Mississippi Valley, and that in all probability this species and its most nearly related congeners were distributed from that center, it may be worth while briefly to inquire, even though it may be possible to do little more than speculate, as to how this distribution was effected.

The true key to the distribution of *Crataegus viridis* L., as of many of our trees and some herbaceous plants, is probably to be sought and ultimately, if ever, found in the records of the flora of the later Tertiary period: a record, unfortunately, very imperfect and but little understood, and one which, at least so far as present day discoveries have gone, seems to have been almost totally effaced in the region under consideration.

It has been pointed out that in Tertiary times a great inland sea or arm of the gulf extended far up the present valley of the Mississippi into what is now southeastern Missouri, occupying all of Missouri lying southeast of a line drawn from Cape Girardeau through Whitewater, Greenbrier, Wappapello, Poplar Bluff and Acorn, coinciding very nearly with the line of the St. Louis, Memphis and Southeastern

[1] Since this paper was written Sargent has described in the twenty-second Annual Report of the Mo. Bot. Garden, four species of this group.

Railway. Into this inland sea the ancient river was discharged approximately one hundred miles south of Saint Louis, and the colony of southern arborescent species now found in that region is undoubtedly a vestige of the semi-tropical forests that once bordered this ancient sea. Beyond this area, however, deposits of Tertiary age are but little developed in the Upper Mississippi Valley, and scarcely a trace of the fossilized flora has been preserved.

It is a fact perhaps not without significance in this connection, that in southwestern Missouri and southeastern Kansas, where, as has been stated, a form of *Crataegus viridis* is abundant, many of the high hills are covered with a deposit of gravel, consisting of waterworn fragments of chert, undoubtedly of local origin, but indicating the former existence of a great drainage system towards the southwest. These deposits, which are particularly abundant about Webb City and Joplin, Missouri, have been designated by geologists as Lafayette Gravel and assigned to a time late in the Tertiary period. Over the higher elevations of the region they may be traced for many miles, indicating the course and magnitude of an ancient river, as in places they attain a thickness of from ten to eighteen feet. This region lies entirely beyond the area of glaciation, which embraced all of northern Missouri and extended a little south of the Missouri River, and this fact doubtless accounts for the preservation of the Lafayette deposits here, while certainly they would have been obliterated to the northward by the ice mantle and the floods that marked its recession and inundated the country far beyond its southern limits.

The Mississippi River of that period, or its precursor, a small and unimportant stream discharging itself into the Tertiary sea, was doubtless bordered by forests of many species. It is reasonable to suppose that the *viridis* form of *Crataegus* would be borne down by the waters of this stream from its northern home and that individuals would establish themselves at intervals along its course and about the coasts of the ancient sea, following the ever extending limits of the land to the south, until at length a form appeared, the *Crataegus viridis* of Linnaeus, as we know it, which found a suitable habitat and attained a vast development in the low-lying coastal plains of the Gulf States.

On the other hand, following the great drainage system to the southwest, other individuals of the parent species would establish themselves along its course and there enter into competition with

plants of a very different region. As the ancient river system gradually became obliterated owing to the elevation of the land to the south and west, the species composing the lowland forests would one by one become extinct and give place to highland or xerophytic species. Through the vicissitudes of this changing order a form of *Crataegus viridis* was in some manner able to maintain itself, as is testified by its abundance at the present time on the limestone hills of southwest Missouri and the region to the southwestward.

Our present knowledge regarding the origin of species is, of course, not sufficient to enable us to do more than conjecture as to how this came about. Possibly a fortuitous variety or type happened to be developed in this region that was better adapted to the new conditions and was thus able to withstand the increasing dryness, so that, while the species became for the most part extinct in the upper part of the ancient river course, this particular stock was entirely isolated from the parent colony and became the progenitor of the forms of *Crataegus viridis* now found occupying the regions of comparatively high altitude in the southwest, comprising the Western Ozark Colony.

If I have not added any new species to the genus *Crataegus* in this paper, I have at least shown that the *Virides* may have *not* come up the Mississippi Valley, as has generally been supposed, but have probably drifted *down* this Valley from the great Upper Mississippi Colony at Hannibal, Missouri and Quincy, Illinois.

Courtney, Missouri.

VIOLA RENIFOLIA AND V. BRAINERDII.

M. L. Fernald.

Botanists who have collected extensively in the Northern States and Canada are familiar with the fact that *Viola renifolia* often appears in two quite different forms: the true *V. renifolia* as described by Gray, with both sides of the leaves "conspicuously beset with pale, soft and tender, lax hairs";[1] and another extreme with the upper leaf-surfaces quite glabrous from the first or in anthesis with

[1] Gray, Proc. Am. Acad., viii. 288 (1870).

only a very few scattered and quickly deciduous hairs. This latter plant, with the upper leaf-surfaces glabrous or quickly glabrate, was separated by Greene in 1902 as *V. Brainerdii*, with the statement that it is "certainly a far more common plant in northern New England and Canada than the kindred species [*V. renifolia*]," [1] and that it has a more upland habitat. But, although the cautious and very accurate student for whom *Viola Brainerdii* was named has not recognized it as a species, he has recently expressed his understanding of the question as follows:

"The type of VIOLA RENIFOLIA Gray is markedly pubescent throughout; but the more common form has at least the upper leaf surface glabrous, and has been published as a species, *V. Brainerdii*, by Professor Greene. But the difference between the two plants, though perhaps worth naming, is not specific, according to my conception of species." [2]

This commoner extreme of *Viola renifolia*, with the leaves glabrous above, though connected with the pubescent extreme by some transitions, is apparently a positive geographic variety and as such it should be separated. That it is, as already stated by Greene and by Brainerd, the commoner plant of the two is shown by the fact that of the 97 specimens of the species in the Gray Herbarium and the herbarium of the New England Botanical Club only 22 are of the typical copiously pubescent *V. renifolia*, while 63 are very good *V. Brainerdii* and 12 represent both extremes under the same label. But, although in northern New England and New York the two are thus sometimes found together and by some collectors have been taken to be trivial variants of the same plant, it is significant that no typical *V. renifolia* seems to have been collected northeast of New England, while in the Maritime Provinces, eastern Quebec, western Newfoundland and southern Labrador the essentially glabrous *V. Brainerdii* with bright green leaves is a common plant. Its more northern tendency is also indicated by the fact that north of the Straits of Belle Isle it is abundant on dry exposed crests where it is associated with many arctic-alpine plants such as *Poa alpina* L., *Salix vestita* Pursh, *Cerastium alpinum* L., and *Saxifraga caespitosa* L.; and in the mountains of the Gaspé Peninsula it ascends to an altitude of 1100 meters, where it is found on dry limestone crests with the plants just

[1] Greene, Pittonia, v. 89 (1902).
[2] Brainerd, Bull. Torr. Bot. Cl. xxxviii. 8 (1911).

enumerated or with *Carex rupestris* All., *Saxifraga nivalis* L., *Dryas integrifolia* Vahl, *Pedicularis flammea* L., *Campanula uniflora* L., and other arctic-alpine types. In the mountains of Colorado also this glabrous plant ascends to high altitudes, reaching 2500 m., and thence it extends northward to northern British Columbia. As a geographic variety it is well marked and it should be called VIOLA RENIFOLIA Gray, var. **Brainerdii** (Greene) n. comb.

GRAY HERBARIUM.

SOME LICHENS FROM NANTUCKET ISLAND, MASSACHUSETTS.

R. HEBER HOWE, JR.

MR. EUGENE P. BICKNELL on a collecting trip to the islands of Nantucket and Tuckernuck, Massachusetts, last June (1911), was kind enough at my request to gather for me a considerable number of lichens. Though Mr. Bicknell had never collected lichens before, the collection he made contains beside the more common species a number of lichens decidedly worth recording.

It is not improbable that some lichenist in the past has collected at Nantucket, but beside a few specimens in my own herbarium collected by non-botanical friends, and a plant or two found in the Alexander W. Wheelock herbarium, I have never seen any specimens from these islands in the large museum herbaria I have from time to time examined. Dr. Riddle writes me, however, that he has noted Nantucket material in various herbaria. It was nevertheless on account of its scarcity that I ventured to ask Mr. Bicknell to gather what specimens he could for me,— and to him I am gratefully indebted.

The lichen flora as exhibited by this collection shows an interesting mixture of littoral and Austral species whose presence it is not difficult to explain by the climatic conditions governing the islands. A few curious northern species are noted.

The plants listed here are now to be found in the author's herbarium; duplicates of a few were sent to Dr. L. W. Riddle and Dr. Ludwig Scriba for their collaborative opinions.

Family: *Usneaceae.* **Group:** *Radiatae* Hue.

Usnea florida (L.) Web., on *Pinus rigida* and oak-post, O'Connell farm, June 4–11; on cockspur thorn, Thornlot, June 4.

Letharia thamnodes (Flot.) Hue, on *Pinus rigida*, O'Connell farm, June 4.

Ramalina rigida (Pers.) Ach., on cockspur thorn, Thornlot, June 4; on *Pinus rigida*, O'Connell farm, June 4.

Ramalina dilacerata (Hoffm.) Wain., on twigs, O'Connell farm, June 4.

Teloschistes chrysophthalmus (L.) Norm., on cockspur thorn, Thornlot, June 4. This plant was also found in the Wheelock herbarium from Nantucket.

Family: *Cladoniaceae.* **Group:** *Stratosi-radiatae* Hue.

Cladonia rangiferina (L.) Web., in swamp, and on edge of bog, Polpis, June 15.

Cladonia sylvatica (L.) Rabenh., on open commons, Madequet, June 17.

Cladonia furcata var. *racemosa* Wain., on ground, Miacomet, June 11, and in swamp, Polpis, June 15.

Cladonia reticulata (Russ.) Wain., on sandy plain, Madequet, June 17; on dry bank, Reed pond, June 16; on edge of bog, Polpis, June 15; on open downs, Hummock pond, June 11; on dry commons, Madequet, June 17.

Cladonia verticellata (Hoffm.) Flke., in sandy swamp, Polpis, June 15.

Cladonia fimbriata f. *simplex* (Weis.) Flot., in swamp on soil, Polpis, June 15.

Family: *Parmeliaceae.* **Group:** *Stratosae* Hue.

Parmelia perlata (L.) Ach., on *Quercus tinctoria*, Tuckernuck, June 17.

Parmelia perforata var. *hypotropa* Nyl., on twigs, June 7; on oak-post and on *Pinus rigida*, O'Connell farm, June 4–11. Tuckerman did not record this variety from north of South Carolina on the Atlantic coast, though Dr. Riddle writes me he has seen it from Nantucket before. I have never collected it in Rhode Island where the typical species is common.

Parmelia Borreri var. *rudecta* Tuck., on cockspur thorn, Thornlot, June 4.

Parmelia caperata (L.) Ach., as above.

Physcia parietina (L.) De Not., on rocks and trees, Coffin home-

stead, June 7. Represented in my herbarium (No. 1651) from Nantucket, collected by W. H. Trumbull, Jr.

Physcia hispida (Schreb, Fr.) Tuck., on rock, Coffin homestead, June 7.

Physcia tribacea (Ach.) Tuck., on rock, Coffin homestead, June 7.

Sticta pulmonaria (L.) Ach., on *Quercus tinctoria*, Tuckernuck, June 17. An interesting station for this rather northern lichen, as it is for *Parmelia perlata* recorded above.

FURTHER NOTES ON THE FLORA OF DUXBURY, MASSACHUSETTS.

John B. May, M. D.

The article in Rhodora for January by Mr. Knowlton interested me greatly, following my residence of several years in the old South Shore town, and I trust that a few additional notes will not come amiss. I must confess, however, that I write, not as a botanist, but merely as an observer and lover of Nature.

There is an interesting story connected with the naturalization of the English oak, *Quercus Robur*, mentioned by Mr. Knowlton. A century ago Duxbury was a famous port, the birthplace of fast clipper ships which sailed all the Seven Seas. One of the old master shipbuilders, noting the rapid disappearance of native timber used in his trade, started the conservation movement in Duxbury by planting groves of chestnut and English oak, bringing the latter from England in his own ships. Whether any of his seedlings survive today is doubtful, for none of the trees I have seen appear over fifty years old, but some of them lived long enough to start a flourishing second generation.

Another Pilgrim to Duxbury, from the West this time, is the Umbrella-weed, *Oxybaphus nyctageneus*, which I found in 1907 as a few plants growing by the roadside, and which in 1911 flourished around barn-yards and ash-heaps, showing a marked increase and wide distribution. *Melilotus alba* also seemed to walk right along the edges of the roads, while a small field near the centre of the town

has been usurped by Grim the Collier, *Hieracium aurantiacum*, where its tawny flowers make a brave showing annually.

From this prosperous foreign invasion, one turns with sorrow to our two largest broad-leaved evergreens, *Ilex opaca* and *Kalmia latifolia*, doomed I fear to early extinction. Mountain laurel is found in a large swamp near Island Creek and there it flourished unmolested until recently, when the ubiquitous cranberry-grower began grubbing it out to make a "bog." The Holly is found in another swamp near-by, but every year at Christmas the few fruiting trees are stripped so ruthlessly that the outlook for seedlings is very poor. Here, too, the "bogger" is at work.

Pleurisy-root, *Asclepias tuberosa*, I noted as a single plant growing near the road from Tinkertown, while near Tarkiln is a colony of *Lupinus perennis*. The Partridge Pea, *Cassia Chamaecrista*, grows freely in a barren field near the shore and in this field within a few rods of salt water I found the Little Ladies' Tresses, *Spiranthes simplex*, growing with *S. gracilis* and *S. cernua*.

In conclusion, I would merely mention the fact that in a two hours walk this Fall I collected over seventy varieties of fungi, many of them edible.

WABAN, MASSACHUSETTS.

A NEW VARIETY OF LESPEDEZA CAPITATA.— A *Lespedeza* closely related to *L. capitata* Michx. but with the leaflets linear-oblong to lanceolate and acuminate has puzzled some of the Connecticut botanists who, judging by the leaflets, have been inclined to call the plant *L. angustifolia* (Pursh) Ell., but a close examination of material of the Connecticut plant from Norwich and Glastonbury shows it to have the short peduncles and long calyx of *L. capitata*. An apparently identical sheet in the Gray Herbarium, collected by F. E. McDonald at Peoria, Illinois, has been referred to *L. capitata*, var. *longifolia* (DC.) T. &. G., but like the Connecticut material it has the stem and the calyx loosely pilose and the leaflets covered beneath with dull pubescence. It is thus not satisfactorily referable to *L. capitata*, var. *longifolia* which, as originally described (as *L. longifolia* DC.), has the leaflets appressed silvery-silky beneath. Material from Beardstown, Illinois, with the narrow leaflets silvery-silky beneath appears to be good var. *longifolia* and this material has the

pubescence of the calyx also appressed and silvery, while the short pubescence of the stem is subappressed. We have been unable to find any description of the extreme of *L. capitata* with narrow acuminate leaflets and dull spreading pubescence and here propose it as

Lespedeza capitata Michx., var. **stenophylla**, n. var., caulibus superne pilosis vel glabratis; foliolis lineari-oblongis vel anguste lanceolatis acuminatis, superne glabris subtus strigosis, pilis opacis; calycibus pilosis, pilis patentis opacis.— Type: open dry ground, Peoria, Illinois, September, 1904, *F. E. McDonald* in Gray Herb. Connecticut: sand bank near Trading Cove Bridge, Norwich, September 15, 1904, *C. B. Graves*; sandy ground along Connecticut River, Glastonbury, September 17, 1911, *C. H. Bissell*.— C. H. Bissell and M. L. Fernald.

FESTUCA OVINA L., VAR. DURIUSCULA (L.) KOCH IN SHELBURNE, NEW HAMPSHIRE.

Walter Deane.

In July, 1909, I visited my friends, Mr. and Mrs. G. N. McMillan on their estate in the Androscoggin valley, Shelburne, in northern New Hampshire, some 700 or 800 feet above sea level. During my visit I examined the grasses that form the turf of the large field adjoining the house. The location is on high land above the river and the grass is cut for hay. Besides the ordinary species, such as *Phleum pratense* L., *Agrostis alba* L., var. *vulgaris* (With.) Thurb., *Danthonia spicata* (L.) Beauv., *Dactylis glomerata* L., *Agropyron repens* (L.) Beauv. and the like, there were three Festucas. Two of these were *Festuca rubra* L. and *Festuca ovina* L., the solitary or few culms of the former distinguishing it from the tufted culms of the latter.

The third Festuca, however, was the most interesting of all, for it proved to be the European *Festuca ovina* L., var. *duriuscula* L. (Koch), credited in Gray's Manual, 7th edition, only as sparingly introduced in Wisconsin and Iowa. It occurred in great abundance over the field in dense tufted mats, covering areas varying from one to ten or more feet across, and the dull reddish color of the spikes on their gracefully nodding culms, especially in a strong breeze, made a pic-

ture more attractive to the botanist than to the agriculturist, for the presence of the plant indicates a barren soil. This grass, as well as the other Festucas, was submitted to Prof. A. S. Hitchcock and Mrs. Agnes Chase of the Department of Agriculture, Washington, D. C. They have given them careful examination and have most kindly communicated to me the following notes on the variety.

Under date of October 19, 1911, Mrs. Chase writes; "The Festuca specimens I have examined and compared with our United States and European material. They fall within the duriuscula circle better than anywhere else. The whole ovina group is a complex, intergrading inextricably. Your plants agree with some determined by Hackel as *F. ovina duriuscula*, except that the leaves of yours are more conspicuously clustered at the base. The European *F. ovina* v. *glauca* (Lam.) Hack. is like yours in habit, but in your specimens of it the panicles as well as foliage are glaucous. This, like *duriuscula*, has glabrous lemmas. The var. *glauca* is not known to grow in America." Prof. Hitchcock writes on February 15, 1912; "I have looked over the specimen of Festuca you sent down and I think it is correctly named (*Festuca ovina* var. *duriuscula*). I have compared it with European specimens and have looked up the descriptions in Hackel's monograph of the European species of Festuca and also Ascherson and Graebner's Synopsis of Middle European plants. Your plant is the subvariety *trachyphylla* Hack. which differs from the typical form of *duriuscula* in having scabrous blades."

Before the development of the farm, about twenty years ago, by Mr. Charles Endicott, the former owner, the area where this variety grows was a typical stone field, thickly covered with stones and boulders of various sizes more or less imbedded in the ground. Many such fields are to-day scattered over northern New England. The obstructions were removed and, after grading was done, a foreign clover was first planted, and this may possibly account for the introduction of the *Festuca ovina* L., var. *duriuscula* (L.) Koch, for it has certainly been established there for a number of years. It is in the more sterile portions of the field, left by the removal of the larger rocks, that this grass flourishes, maturing by the end of June, and it is in similar situations in the same field that *Euphorbia Cyparissias* L. fruits so abundantly, as was recorded in Rhodora, xii. 57–61 (1910).

There is no reason why this European grass should not be found elsewhere in New England in suitable localities, and doubtless, now

that attention has been called to it, this will prove true. This Festuca is in my herbarium, while specimens have been deposited in the Gray Herbarium, the Herbarium of the New England Botanical Club, and the Herbarium of the United States Department of Agriculture at Washington, D. C.

Cambridge, Massachusetts.

A Flora of the New Jersey Pine Barrens.—Mr. Witmer Stone's[1] flora of southern New Jersey is one of the notable local floras of recent years. In the author's own words, "it places on record the present condition and history of one of the most interesting botanical areas in the United States,— the Pine Barrens of New Jersey." The introductory chapter is a detailed statistical study of the entire indigenous flora of southern New Jersey. It presents a division of the species into four groups; (1) the species of wide range north and south of New Jersey, (2) northern species which reach their southern limit in or near southern New Jersey, (3) coastal plain species which reach their northern limits between southern New Jersey and the northeastern extension of the coastal plain in Massachusetts, and (4) species of local distribution in or near southern New Jersey. A further analysis shows the composition of the flora of each of the five distinct floral districts; (1) The West Jersey, or middle district (covering the Delaware Valley region south of Trenton, and also the country below the fall line and north of the Pine Barrens), (2) the Pine Barrens, (3) the coastal strip, (4) the Cape May district, and (5) the maritime district. The floral analysis is similar to that in Prof. Fernald's recent discussion of the origin of the Newfoundland flora (v. Rhodora XIII, p. 135 et seq. 1911) and is likewise accompanied by maps illustrating the several types of distribution.

The author concludes that in the New Jersey Pine Barrens we have some of the sand and bog elements of a formerly wide-spread *austral* flora which has been largely "superseded" over most of the coastal plain by more "advanced" elements of similar origin. Mr. Stone weakens his own conclusion by classing many plants with floras to which they certainly do not belong. Thus, the typical pine-barren *Schizaea pusilla* and *Corema Conradii* are considered by Mr. Stone as boreal species which have been driven south, whereas there seems to be no escape from Fernald's conclusion that they are of austral origin. In listing the southern elements in the pine barren flora, Mr. Stone fails to distinguish between species which in the south are coastal only

[1] Stone, Witmer: The plants of southern New Jersey, with especial reference to the Flora of the Pine Barrens and the geographic distribution of the Species. Ann. Report N. J. State Mus. 1910. Part II, pp. 21–828, ff. 1–5, CXXIX plates + map. (Trenton, 1912.)

(e. g. *Lycopodium carolinianum*) and others which are high Alleghanian (e.g. *Leiophyllum buxifolium*). On the other hand *Rhododendron maximum*, an Alleghanian type, is listed as boreal, which it certainly is not! The detailed statements of species distribution in the author's own area, however, leave little to be desired. The data are based upon many years of active field work by Mr. Stone and his associates, Messrs. Bayard Long and S. S. Van Pelt, and on the critical study of more than 33,000 herbarium specimens. It appears from the frequent acknowledgment of his aid that Mr. Long also had a considerable share in the determinative work.

As in several late local floras, the systematic catalogue of the species is interpolated with keys to the families, genera, and species. The keys include introduced weeds, which, however, are not further mentioned except in brief foot-notes. The native plants are not described, but there are free notes on distribution, characters, local history, etc., which transform what would otherwise be a bare catalogue into an account which can be read for pleasure. The notes on Schizaea and Corema may be mentioned as among the more interesting ones.

It is not always clear why the author disposes as he does of some of the minor variations of species. For example, nothing would have thrown more light on the geographic affinities of the pine barren flora than the recognition of *Juncus effusus* var. *conglomeratus*, and further notes on its distribution. Again, should we not be told why the author fails to recognize the coastal plain beech as distinct from the Alleghanian form? In Maryland and Virginia, the varieties of Peltandra proposed by Mr. Tidestrom (Rhodora XIII, p. 47, 1910) are very distinct, although known from few stations. If Mr. Stone has found them frequently enough to feel confident in regarding them as individual variations, a more detailed discussion of them would be welcome. Other cases might be mentioned in which decisions between conflicting views regarding the taxonomic status of forms seem to have been made arbitrarily. This fault, however, is more than overbalanced by the care with which the record of every species admitted to the flora has been put on a firm basis. The author has spared no pains in searching out old indefinite records, which he has either substantiated or discredited. Another feature of the book which deserves high commendation is the accurate statement, for each species, of the date of flowering, ripening of the fruit, or maturation of the spores, as the case required. These data were supplied by Mr. Bayard Long, who also contributed an account of the methods and objects of his investigation (p. 115).

Mr. Stone's ideas on nomenclature, to the reviewer at least, are thoroughly objectionable. He believes, for example, that botanists should follow that zoological usage which permits old varietal names to displace later specific names. Happily, most botanists have not

been "playing the game" of nomenclature so long that it has been impossible to reconvert the erring ones to sound doctrine (on this point at least) before the "game" became too much an object in itself to be renounced. Even at the risk of seeming to lay undue emphasis upon points which in a local flora are comparatively unimportant, attention should be called to certain nomenclatorial practices which are either distinctly retrogressive or else totally at variance with the botanical traditions which should guide botanical authors. A distinctly retrogressive tendency is shown in the continued use of "duplicate monomials"; the method of author citation is an instance of useless and uncalled for violation of botanical tradition. Only one author (the one who first used the specific or "subspecific" adjective) is cited,— in parenthesis if the name has been modified by later authors, but otherwise not. One need not look beyond the pages of the New Jersey flora to see how this method lends itself to error, for in the cases of seventeen out of the sixty "subspecific" names which Mr. Stone uses, he has misapplied the parentheses. If zoologists commonly ascribe a quarter of the names they mention to authors who never published them, it is sincerely to be hoped that botanists will not follow zoological precedent.

A practice which cannot be too strongly condemned is that of making new combinations without in any way indicating them as new. (See Bot. Gaz. xliv, p. 304, 1907.) This Mr. Stone appears to have done in eleven cases among the sixty "subspecific" names in his book. There are also new combinations among the specific names. For example, *Panicum commonsianum addisonii* "Nash," *Carex leptalea harperi* "Fernald," *Rubus villosus enslenii* "Tratt.," *Euthamia graminifolia nuttallii* (Greene), *B[lephariglottis] canbyi* "Ames," and *Gyrostachys beckii* (Lindley) are all new combinations, but not indicated as such; those with the authority in quotation marks are moreover "falsely branded"; finally, all illustrate the abominable habit which zoologists have of decapitalizing personal names.

Except for nomenclatorial innovations "The Plants of Southern New Jersey" is a remarkably pleasing work. It has numerous carefully executed illustrations,— line-drawings, photographs of paintings by H. E. Stone, and photographs from nature. Some of them, especially the photographs of grasses and sedges, it would be hard to excel. It is safe to predict that none of the local floras now current will be longer held in esteem by botanists generally than this one of Mr. Stone's. To special students of the coastal plain vegetation it will of course be indispensable. Such a work reflects great credit not only upon its author but also upon the state which publishes it and upon those members of the Philadelphia Botanical Club whose enthusiastic cooperation made it possible.— H. H. Bartlett, Bethesda, Maryland.

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RHODODENDRON CAROLINIANUM, A NEW RHODODENDRON FROM NORTH CAROLINA.

By Alfred Rehder.

For a year we have cultivated at the Arnold Arboretum a Rhododendron which was received from the nurseries of Harland P. Kelsey of Highlands, North Carolina, under the name *Rhododendron punctatum.* Growing side by side with the *R. punctatum* Andrews brought over from the Botanic Garden in Cambridge where it was introduced from the South about 60 years ago probably by Asa Gray, the two plants present marked differences at the first glance. The plant from North Carolina forms a low compact bush with broad leaves, flowering after the middle of May before the development of the shoots of the year, while the other plant which agrees exactly with the form figured by Andrews and cultivated formerly in European gardens,[1] is a taller loose-growing shrub with narrower leaves, and it flowers about four weeks later, when the young shoots springing from below the inflorescence are already developed and overtop it. Generally the differences as regards habit, shape of the leaves, time of flowering and also the shape of the corolla are about the same as those between *R. catawbiense* and *R. maximum*, only in a lesser degree. In examining the available herbarium material I find that both forms are native to the southern Atlantic States; the low compact form being apparently restricted to the high mountains of North Carolina, while the other form inhabits lower altitudes and has a wider distribution.

[1] The plant now in cultivation in Europe as *R. punctatum* seems to be a hybrid between *R. punctatum* and *R. ferrugineum.*

The Rhododendron generally known as *R. punctatum*, was discovered in 1788 by Michaux on the banks of the Savannah River and in 1792 briefly described under the name *R. minus* (in Jour. d'Hist. Nat. I. 412) in the following words: "Rhododendron minus, foliis minoribus ellipticis petiolatis subferrugineis. Se trouve sur les rives de la rivière de Savannah." Though the description is rather short, the species is sufficiently characterized, particularly by the description of the leaves as subferrugineous, since the two other species of the Atlantic States known to Michaux, *R. maximum* and *R. catawbiense*, have perfectly glabrous foliage. There can be, therefore, hardly any doubt what Michaux meant, and his name being six years older than Andrews' *R. punctatum* based on cultivated specimens introduced about 1786 by John Fraser, must be considered the valid name for this species. Both names refer to the same form, namely to the form of the lower altitudes; for this is the form represented by the plate accompanying Andrews' description, and in regard to Michaux's species the locality quoted with the first description leaves no doubt. The identity of the two species is also confirmed by Michaux's original specimens which I had the opportunity of examining last year; of the three sheets two are without labels and one has two labels; all contain the form of the lower altitudes, partly in flowering specimens, and only the sheet with two labels contains besides these specimens two branchlets of the form of the higher mountains in fruit; to these two specimens belongs apparently the label reading "hautes montagnes de Caroline septentrionale" while the label reading "aux sources de la rivière Savannah" belongs to the other specimens and corresponds to the locality given in the first description: in his Flora he quotes both localities, but the description is based also here chiefly on the form from the lower level, as he had no flowering material of the other shrub.

The first to recognize the form of the higher mountains as distinct was Ker when he figured it in 1815 as *Rhododendron punctatum β* in the Botanical Register. He states there that it was only lately introduced from North Carolina by John Fraser who also had introduced the typical *R. punctatum*. This form, however, seems to have been subsequently lost to cultivation, as it is never mentioned again in horticultural or botanical literature. All later references and descriptions apply only to the other form, until in 1902 Small distinguished the two forms as species, but unfortunately he identified

the form of the higher mountains with *R. punctatum* and gave a new name, *R. Cuthberti*, to the true *R. minus.* It is, however, the form of the higher mountains which is in need of a name, if the two forms are considered distinct species, and I propose *Rhododendron carolinianum* as a fitting name, because it seems to be restricted to North Carolina, while the other species ranges farther south.

Rhododendron **carolinianum** Rehder, n. sp. *Rhododendron punctatum β* Ker, Bot. Reg. I. t. 37. 1815. *R. punctatum* Small, Fl. Southeast. U. S. 884. 1903 (non Andrews). Frutex ramis crassiusculis; ramuli novelli virides v. purpurascentes, squamis ferrugineis laxe conspersi; gemmae floriferae ovoideae, acutae, circiter 1 cm. longae, perulis 7–9 late ovatis acuminulatis dense minuteque albofimbriatis extus ferrugineo-lepidotis, gemmae foliiferae multo minores et angustiores. Folia coriacea, ovalia v. elliptica v. anguste elliptica, basi late cuneata, apice acutiuscula v. in acumen breve contracta, 5–8 cm. longa et 2.5–4 cm. lata, supra initio lepidota, mox glabra, subnitentia, intense luteo-viridia, subtus pallidiora, dense v. interdum sparsius ferrugineo-lepidota, margine leviter revoluta, nervis utrinsecus circiter 8 obsoletis, costa media supra vix, subtus manifeste elevata; petioli robusti, circiter 1 cm. longi, ferrugineo-lepidoti. Flores 4–9 in racemo umbellato terminali, sub anthesi innovationibus vix evolutis; pedicelli 1–1.5 cm. longi, lepidoti; sepala semiorbicularia v. lata ovata, 1 mm. longa, trientem ovarii vix aequantia, extus et ad marginem lepidota; corolla rotato-campanulata, 2.5 cm. longa et 3.5–4 cm. diam., lobis late ovatis margine planis apice rotundatis tubum brevem e basi sensim ampliatum subaequantibus v. eo paullo longioribus, pallide roseo-purpurea v. rarius albida, maculis destituta v. interdum sparse maculata, extus glabra v. sparsissime lepidota; stamina 10, inaequalia, corolla paullo breviora, filamentis basi villosis, antheris pallidis; stylus glaber, staminibus paullo brevior, purpureus; ovarium conico-oblongum, dense albido-lepidota. Capsula anguste oblonga, 8–12 mm. longa et 3–4 mm. crassa, fusca.

Low compact shrub with thickish branches; young branchlets greenish or purplish lepidote; floriferous winter-buds ovoid, acute, about 1 cm. long, with 7–9 broadly ovate scales mucronate and densely white-ciliolate, outside lepidote. Leaves coriaceous, oval or elliptic to elliptic-oblong, broadly cuneate at the base, acutish at the apex or shortly acuminate, 5–8 cm. long and 2.5–4 cm. broad, above at first lepidote, soon becoming glabrous, somewhat lustrous, deep yellowish green, paler beneath and densely or sometimes more sparsely lepidote, slightly revolute at the margin, with about 8 pairs of obscure veins, midrib above slightly, beneath strongly elevated. Flowers 4–9 in dense umbel-like terminal racemes, the young shoots at the flowering time scarcely developed; pedicels 1–1.5 cm. long, lepidote; sepals semiorbicular or broadly ovate, scarcely one third as long as

the ovary, outside and on the margin lepidote; corolla rotate-campanulate, 2.5 cm. long and 3.5–4 cm. wide, pale rosy-purple or rarely whitish, without spots or only slightly spotted, outside glabrous or very sparingly lepidote, the lobes broadly ovate, about as long or slightly longer than the short gradually widened tube; stamens 10, slightly shorter than the corolla, with the filaments villous at the base and with pale-colored anthers; style glabrous, slightly shorter than the stamens, purple; ovary conic-oblong, lepidote. Capsule narrow oblong, 8–12 mm. long and 3–4 mm. thick, brown.

North Carolina: Tyron, April 20, 1897 (Biltmore Herb. No. 4463); Roan Mtn., June 16, 1879 (*A. Gray, C. S. Sargent, J. H. Redfield & Wm. W. Canby*); Table Rock Mtn., Burke Co., July 2, 1890, *J. K. Small & A. A. Heller* (No. 281, in part, the specimens in fruit); Macon Co., (*T. G. Harbison*, Nos. 119, 168); cultivated at Highlands, from Linville Mtn., May 20, 1911, (*T. G. Harbison*, No. 626); without precise locality, 1889 (*F. Boynton*).— At one time this species seems to have been cultivated in the Botanic Garden at Cambridge, for there is a specimen in the Gray Herbarium collected by C. E. Faxon, and dated June 18, without indication of the year, but probably collected about 1870.

Rhododendron carolinianum is easily distinguished from *R. minus* by the short and wide tube of the corolla as long as, or slightly shorter than the lobes; the corolla is usually not spotted and is glabrous outside, the leaves are generally broader, less pointed and of thicker texture, the branches are shorter and stouter forming a compact, usually low shrub and the flowers appear several weeks earlier, before the young leaves are out. As an ornamental plant it is superior to *R. minus* and has proved perfectly hardy at the Arnold Arboretum and in General Weld's garden at Dedham where a large number of plants have been established for several years.

Small gives for his *R. punctatum*, which, according to his description, is identical with this species, a distribution ranging from North Carolina to Tennessee, Georgia and Alabama, but I have seen it so far only from North Carolina.

Rhododendron minus Michaux, Jour. d'Hist. Nat. I. 412. 1792, and Fl. Bor. Am. I. 258. 1803; Persoon, Syn. Pl. I. 478. 1805. *Rhododendron punctatum* Andrews, Bot. Rep. I. t. 36. 1798; Donn, Hort. Cantabr. 49. 1786 (nomen nudum); Pursh, Fl. Am. Sept. I. 298. 1814; Willdenow, Sp. Pl. II. 607. 1799; Ventenat, Descr. Jard. Cels. t. 15. 1800; Aiton, Hort. Kew. ed. 2, III. 51. 1811; Sims, Bot. Mag. XLIX. t. 2285. 1822; Watson, Dendr. Brit. t. 162 A. 1825; Chapman, Fl. South. U. S. 266. 1860; Gray, Syn. Fl. N. Am. II. 1, 42. 1878. *Rhododendron Cuthberti* Small, Torreya, II. 9. 1902, and Fl. Southeast. U. S. 885. 1903.

Georgia: Banks of the Savannah River (*A. Michaux*, in Herb. Mus. Paris, type); near Augusta, *S. T. Olney & J. Metcalf* (no. 123); river bank at Locks, near Augusta, May 16, 1901, (*A. Cuthbert*, type of *R. Cuthberti*); same locality, March 30, 1908, (*C. S. Sargent*); two miles northwest of Cuthbert, Randolph Co., July 21, 1903 (*R. M. Harper*, No. 1895); north slope of Pine Mtn. near Flint River, Meriwether Co., June 9, 1910 (*R. M. Harper*, No. 2261); dry rocky ridges, Banks Co., Sept. 24, 1910, (*T. G. Harbison*, No. 155); Hull Co., near Cornelin, May 17, 1911 (*T. G. Harbison*, No. 609). North Carolina: Table Rock Mtn., Burke Co., *J. K. Small & A. A. Heller*, July 2, 1891 (No. 281, in part, the specimens in flower). Alabama: Sulphur Mtns. near Tulledaga Springs, May 15, 1911, (*T. G. Harbison*, No. 591); bank of Chestnut Creek, below Verbena, Chilton Co., Feb. 2, 1906, *R. M. Harper* (No. 26).

Rhododendron minus is chiefly distinguished from *R. carolinianum* by the longer cylindric corolla-tube which is longer than the lobes, by the corolla being lepidote outside and the upper lobe being distinctly spotted. The habit of the plant is much looser and more straggling with longer and slenderer branches and the leaves are larger and comparatively narrower and more pointed.

The type locality of *Rhododendron minus* seems to be the same as that given for *R. Cuthberti*, for Michaux mentions in his Journal under the entry for November 11, 1788, among the plants observed near Augusta, Georgia, on the banks of the Savannah River an unnamed Rhododendron and again under December 4 he records in the vicinity of Seneca (Oconee Co.) a Rhododendron *species nova* which is without doubt the same. As Michaux refers the deciduous Rhododendrons to *Azalea*, the only other species of Rhododendron growing in this region is *R. maximum* with which Michaux of course was perfectly familiar; the unknown species therefore could not have been any other than *R. minus*. As Michaux in his first description of *R. minus* does not mention the flowers and as he states that it grows on the banks of the river Savannah, it is most likely that his description is based on the specimens collected in November, 1788, near Augusta.

The leaves of the plant cultivated in Europe as *R. punctatum* are generally somewhat smaller and narrower than those of the wild specimens from Georgia, but in the shape of the corolla both plants agree perfectly.

In Banks County, Mr. T. G. Harbison has collected a form of *Rhododendron minus* with considerably larger flowers, which seems worthy of being introduced into cultivation on account of its much more

showy flowers. Though it can hardly be considered a botanical variety, it seems advisable to give it a distinct name.

Rhododendron minus f. **Harbisonii**, forma nova.

A type differt floribus majoribus, 3.3–4 cm. longis in racemis circiter 10–floris, sepalis inaequalibus majoribus ovatis longe ciliatis.

Georgia: Banks Co., May 18, 1911, *T. G. Harbison* (Nos. 615, 616 in Herb. Arnold Arboretum).

This differs from the typical form which has the flowers 2.5–3 cm. long and the racemes generally 7–8-flowered, in the larger flowers and larger racemes; also the leaves are somewhat larger, attaining 11 cm. in length. In its large flowers and denser flower-clusters it resembles *R. Chapmanii* Gray, but that species has smaller obtuse or acute, not acuminate leaves very densely lepidote beneath and revolute at the margin.

Arnold Arboretum.

THE FORMS OF PELTANDRA VIRGINICA.

Sidney F. Blake.

Plate 94.

In 1836 Rafinesque, in the New Flora of North America, part 1, pp. 85–89, elaborated his previous treatment of the genus *Peltandra* into a monograph in which eight species were described, founded principally on differences in leaf outline,[1] although the number of seeds and some supposed diagnostic characters from petiole, scape, and spathe were also employed. Of Rafinesque's species two were recently taken up as varieties by Mr. Ivar Tidestrom,[2] on the basis of field study of the plants in Maryland and Virginia. My collection last fall of one or two forms obviously distinct from any of these has led to a study of Rafinesque's monograph in connection with the material in the Gray Herbarium, the herbaria of the New England Botanical Club and the Boston Society of Natural History, and a

[1] Except *P. alba* Raf. (= *P. sagittifolia* (Mx.) Raf.), type of the subgenus *Leucospatha* Raf.

[2] Rhodora 12:47–50, pl. 83 (March, 1910).

small amount in my own herbarium, in which it has been possible to distinguish seven forms, differing from each other apparently in leaf characters only.

The forms, in their range of variation strongly suggestive of those of *Sagittaria latifolia*, fall naturally into three groups: one group of three forms with broad leaves with short and broad basal lobes or ears, another of two forms having narrower, more acute leaves with longer, narrower ears, and a third composed of two forms with lanceolate acuminate leaves having very short unequal ears or none at all. The two plants treated of by Tidestrom as var. *heterophylla* (Raf.) Tidestrom and var. *angustifolia* (Raf.) Tidestrom make up this last and most aberrant group, with lance-oblong or narrowly lanceolate, acuminate leaves tapering or rounded or very shortly and equally eared at base. These two plants, Rafinesque's *P. heterophyla*[1] and *P. angustifolia*, although very close to one another and undoubtedly intergrading, may perhaps be maintained as distinct formae.

From *Peltandra heterophyla* a few apparently transitional specimens lead to the second pair of formae, possessing distinct but narrow basal lobes, and differing among themselves in size of leaf and development of the ears. One of these, a form with pointed generally narrow leaves and elongated usually divergent basal lobes often twice as long as the breadth of leaf, may possibly be the same as *P. hastata* Raf., with "leaves equal in length oblong, hastate cordate acuminate, lobes subacute"; the probability of this has not however seemed to me sufficient to justify the adoption of the name. Rafinesque remarks that his plant has several seeds, hence, "is a Leucospatha like the next," which is *P. alba* Raf. (now called *P. sagittifolia* (Mx.) Raf.), the type of the well distinguished subgenus *Leucospatha* Raf., and a plant to whose normal leaves the description just quoted well applies. *Arum virginicum* as understood by Elliott, considered by Rafinesque identical with his *P. hastata*, is not by Elliott's description to be distinguished from plants of the ordinary form with hastate basal lobes.

The third group, comprising two forms beside the type of the species, is distinguished from the last by its broad leaves with distinct but short and broad ears. The most extreme of these, a form with very broad leaves nearly equilaterally triangular, and with obtuse or often subacute basal lobes, seems to be identical with Rafinesque's *P.*

[1] This orthography was apparently always employed by Rafinesque in the numerous cases where this name was applied to new "species" in the "New Flora."

latifolia with "leaves broad triangular sagittate,....often one foot long and broad." Of the two forms with more elliptical leaf outline, one, represented by a single sheet from Delaware collected by Commons, has broad leaves with a rounded tip and broadly rounded ears nearly or quite closing the sinus. The other form, which, following Tidestrom, is here taken as the type of the species, has a narrower more acute leaf with narrower deltoid ears.

The absence of a distinct geographical range, or even of a difference in habitat,[1] in the case of any of the forms, coupled with the fact that the differences are purely foliar and that intergrades are frequent, has led me to rank these plants as formae rather than varieties.

In the following synopsis I have arranged the forms after what seem to be their natural affiliations.

* Leaves broad ((3)7–17.5 cm. wide), with distinct basal lobes 2–13 cm. long.
+– Leaves with blade[2] (10)14–22 cm. long, 8–17.5 cm. wide; basal lobes broad (3–7.5 cm. wide), short, nearly always less than width of blade, deltoid to deltoid-lanceolate, or rounded.
++ Leaves very broad, almost equilaterally triangular, 18.5–28 cm. across the tips of the ears, these obtuse or subacute, ¾ as long as main blade; sinus open.

1. Peltandra virginica (L.) Kunth f. **latifolia** (Raf.) n. comb. *P. latifolia* Raf. l. c. 87. "South New Jersey and Delaware," Rafinesque. Specimens examined: Massachusetts: North Cambridge, July 15, 1890 (*Sereno Watson*). Delaware: Wilmington, June 2, 1890 (*A. Commons*).

++ ++ Leaves elliptical or elliptical-oblong, not equilateral (11–20 cm. between tips of the ears).
= Leaves broad and rounded (blade 16–19.5 cm. long, 16.5–17.5 cm. wide); basal lobes broadly rounded, scarcely or not projecting at sides of leaf, ½ as long as the blade; sinus nearly or quite closed.

2. P. virginica f. **rotundata**, n. forma.[3] Type sheet (in Gray Herb.): Delaware: Wilmington, June 2, 1890 (*A. Commons*).

= = Leaves more oblong (blade (10)14–22 cm. long, 8–17 wide); basal lobes obtuse, usually narrowed toward the tip, ¼–½ the length of blade, usually somewhat diverging; sinus open.

3. P. virginica (typical form). *P. undulata* Raf., *P. canadensis* Raf., l. c. 87. Typical specimens examined: Maine: Livermore

[1] Mr. Tidestrom found var. *angustifolia* growing with the type at Nanjemoy Creek, Maryland; Dr. B. L. Robinson collected two forms under his number 161 at East Jaffrey, New Hampshire; and I found three forms growing in a Sphagnum bog in Canton, two about a pond in West Stoughton, and two in a ditch in woods in Norwood, Massachusetts.

[2] Blade is measured from top of petiole to tip of leaf.

[3] P. virginica f. **rotundata**, n. forma, foliis rotundatis, lamina (vide supra) 16–19.5 cm. longa, 16.5–17.5 cm. lata; lobis basilariis late rotundatis, vix aut omnino non divergentibus, dimidio longis lamina; sinu prope vel ex toto clauso.

Falls, 1878 (*Miss Furbish*); Brunswick, 1882 (*Miss Furbish*); Spruce Pond, Cornish, July, 1900 (*A. H. Norton*). New Hampshire: E. Jaffrey, 8 July, 1897 (*B. L. Robinson* 161 part). Massachusetts: Beaver Brook Reservation, May 26, 1894 (*W. H. Manning*); Stony Brook Reservation, June 17, 1895 (*G. L. Chandler*); damp ground near pond, West Stoughton, 23 Sept., 1911 (*Blake* 3378); Sphagnum bog, Canton, 13 Sept., 1911 (*Blake* 3325); ditch in woods, Norwood, 12 Oct., 1911 (*Blake* 3440). Delaware: Wilmington, June 2, 1890 (*A. Commons*). Maryland: Marshall Hall, July 23, 1890 (*J. N. Rose*) and June 23, 1905 (*Ivar Tidestrom*); swamp along Potomac River, near Chainbridge, above Washington, July, 1904 (*Ivar Tidestrom*). District of Columbia: Washington, river swamp, May 29, 1896 (*E. S. Steele*). Florida: Miami River, Feb. 5, 1892 (*J. H. Simpson*); swamps in water, vicinity of Eustis, Lake Co., April 15–30, 1894 (*G. V. Nash* 453).

+ + Leaves comparatively narrow, 6–12 cm. broad, acute to acuminate; basal lobes longer (mostly one to two times the breadth of blade), narrow (1–3.5 cm. broad near the middle), mostly lanceolate or linear lanceolate in outline.

++ Leaves larger and broader (main blade 10.5–23.5 cm. long, 6–12 cm. broad;) basal lobes longer, (5)7–13 cm. long, often twice the breadth of leaf, widely divaricate.

4. P. virginica f. **hastifolia**, n. forma.[1] *?P. hastata* Raf. Type sheet No. 4530, my herb.; damp ground near pond, West Stoughton, Massachusetts, 23 Sept., 1911, Blake 3377; paratype, No. 4531, same data, in Gray Herb. Other specimens examined: Maine: Spruce Pond, Cornish, July, 1890 (*A. H. Norton*). Massachusetts: Malden, July 2, 1890 (*L. L. Dame*), and July 2, 1876 (*H. L. Moody*); ditch in woods, Norwood, 12 Oct., 1911 (*Blake* 3441). Connecticut: rare, in pond, Southington, July 12, 1899 (*L. Andrews* 820); ponds, Southington, July 12 and Aug. 18, 1899 (*Bissell* 881). Michigan: (no other data).

++ ++ Leaves smaller and narrower (main blade 10.5–20 cm. long, 3–5.5 cm. wide near middle); basal lobes shorter (2–7 cm. long), the lobes only rarely divergent.

5. P. virginica f. **brachyota**, n. forma.[2] Type sheet (in Gray Herb.): New Hampshire: Contoocook River, East Jaffrey, 6 Aug., 1898 (*W. Deane and B. L. Robinson* 574). Other specimens examined: New Hampshire: abundant in shallow water of river; East Jaffrey, 8 July, 1897 (*B. L. Robinson* 161 part). Massachusetts: Lynnfield, June 17, 1879 (*H. A. Young*); wet meadow around Doleful Pond, Stoneham, July 9, 1896 (*W. P. Rich*); sphagnum bog, Canton, 13

[1] P. virginica f. **hastifolia**, n. forma, foliis acutis vel acuminatis, lamina 10.5–23.5 cm. longa, 6–12 cm. lata, lobis basilariis angustis, (5)7–13 cm. longis, latitudine laminae saepe duplo longioribus, late divaricatis.

[2] P. virginica f. **brachyota**, n. forma, foliis minoribus, angustioribus, lamina 10.5–20 cm. longa, 3–5.5 cm. lata, auribus brevioribus, 2–7 cm. longis, raro divaricatis.

Sept., 1911 (*Blake* 3328); shallow water, Centerville, July 3, 1900 (*Mrs. C. I. Cheney*); Stockbridge, Aug. 20, 1902 (*R. Hoffman*). Delaware: Wilmington, June 1890 (*A. Commons*).

* * Leaves narrow (2.5–5 cm. wide), generally acuminate, with rounded, oblique or cordate base, the ears when present very short (1–2 cm. long) and unequal.

+ Leaves oblong or lance-oblong, acute or acuminate, 15.5–19 cm. long, 4.5–5 cm. broad; base oblique, rounded, or unequally and shortly eared.

6. P. virginica f. **heterophylla** (Raf.) n. comb.[1] *P. heterophyla* Raf. l. c. 88. *P. virginica* var. *heterophylla* Tidestrom, l. c. 49. According to Rafinesque, southern New Jersey and Delaware, also "even near Philadelphia in the Schuykill." Specimens examined: Massachusetts: sphagnum bog, Canton, 13 Sept. 1911 (*Blake* 3329 [leaves small, only 6.5–9 cm. long — perhaps not really this form]). Maryland: rare, Marshall Hall, June 22, 1905 (*Ivar Tidestrom*).

+ + Leaves very narrowly lanceolate, long acuminate, 23.5–28 cm. long, 2.5–3.5 cm. wide; base oblique or rounded.

7. P. virginica f. **angustifolia** (Raf.) n. comb. *P. angustifolia* Raf. l. c. 89. *P. virginica* var. *angustifolia* Tidestrom, l. c. 50. "Virginia &c.," Rafinesque. Specimens examined: Maryland: rare, Nanjemoy Creek, June 1906 (*Ivar Tidestrom*).

Stoughton, Massachusetts.

Explanation of Plate 94.

Fig. 1. *Peltandra virginica* f. *latifolia* (Delaware, *Commons*. Not an extreme of the form).

Fig. 2. *P. virginica* f. *rotundata* (leaf from type sheet).

Fig. 3. *P. virginica* f. *hastifolia* (Michigan).

Fig. 4. *P. virginica* f. *brachyota* (leaf from type sheet).

(The three other forms were well figured by Mrs. Chase in Rhodora for March, 1910.)

[1] It may be well to mention that the youngest leaves of the seedling (as shown by sheets collected by Walter Deane on shore of "Glacialis," Cambridge, Massachusetts, May 20, 1894) are of this type, suggesting that it represents the primitive leaf-form in the species.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XV.

CYPERACEAE.

CAREX, O TO Z.

C. Oederi Retz. Swampscott (*C. W. Swan*, Aug. 5, 1886, specimen in herb. N. E. Botanical Club).

C. Oederi Retz., var. **pumila** (Cosson & Germain) Fernald. Salt marshes, meadows and shores, from Cambridge (1840) and Revere northeastward along the coast.

C. oligosperma Michx. Cold bogs and meadows, rare; Tewksbury, Bedford, Concord, Wellesley, Norfolk.

C. pallescens L. Fields and meadows, common throughout.

C. panicea L. Wet fields and meadows; well distributed except in extreme northern and western towns. "Cambridge, swamps on Mr. Norton's estate, June, 1838, E. T. Jr." [*Edward Tuckerman*].

C. pedunculata Muhl. Peabody (*J. H. Sears*, July 10, 1881); Shaker Glen, Woburn (*Wm. Boott*, May 14, 1865; *E. F. Williams*, May 12, 1895; *J. M. Greenman*, May 2, 1897; *W. P. Rich & E. F. Williams*, May 9, 1897); Fresh Pond, Cambridge (no data, specimen in herb. Bost. Soc. Nat. Hist.); Bussey's Mt., Jamaica Plain [W. Roxbury] (*E. & C. E. Faxon*, May 30, 1879).

C. pennsylvanica Lam. Dry sterile soil, very common throughout.

C. pennsylvanica Lam., var. **lucorum** (Willd.) Fernald. Wilmington, Burlington, Stoneham, Malden, Medford, Norwood, Milton, Halifax.

C. platyphylla Carey. Rich woods; Andover, Hamilton, Salem, Cambridge, W. Roxbury; Middlesex Fells, according to Deane, Fl. Metrop. Park Comm. 93, 1896; Hingham, according to T. T. Bouvé, The Botany of Hingham 132, 1893.

[In Dame & Collins, Fl. Middlesex Co. 118, 1888, this species is recorded from Medford, collected by C. E. Perkins. An examination of the specimen in the New England Botanical Club Herbarium shows it to be *C. laxiflora* Lam., var. *patulifolia* (Dewey) Carey.]

C. polygama Schkuhr. Swamps and meadows; frequent from Canton, Norwood and Framingham northward.

C. prasina Wahlenb. Wet banks of brooks in woods, rare; Newburyport, Medford, Winchester, Arlington, Belmont, Framingham.

C. Pseudo-Cyperus L. Lowell (*C. W. Swan*, July 5, 1880); big spring, Purgatory Swamp, Norwood (*G. G. Kennedy*, June 30, 1908).

C. ptychocarpa Steud. Purgatory Swamp, Norwood (various collections from June 23, 1879 to June 4, 1899); "near Boston" (*Wm. Boott*, no date, specimen in Gray Herb.).

C. retroflexa Muhl. Dry open woods; Boxford, Malden, Stoneham, Woburn, Newton, W. Roxbury, Dedham, Milton; Concord and Melrose, according to Dame & Collins, Fl. Middlesex Co. 119, 1888.

C. riparia W. Curtis. Swamps and stream-borders; occasional in central and northeastern portions.

C. rosea Schkuhr. Woods, common, but not reported from southeastern towns.

C. rosea Schkuhr, var. **radiata** Dewey. Andover (*A. S. Pease*, June 6, 1904, specimen in herb. A. S. Pease).

C. rosea Schkuhr, var. **minor** Boott. Shaker Glen, Woburn (*C. W. Jenks & C. W. Swan*, July 10, 1888); "Concord Turnpike" (*Wm. Boott*, June 10, ——).

C. rostrata Stokes. Bogs and wet shores; frequent in central portion; one station between N. Andover and Boxford, in Essex Co.

C. rostrata Stokes, var. **utriculata** (Boott) Bailey. Reported as frequent from Randolph and Norwood northward.

C. salina Wahlenb., var. **kattegatensis** (Fries) Almq. (var. *cuspidata* Wahlenb.). Brackish shores of Mystic River and Alewife Brook in Medford (*Wm. Boott*, June 13, 1853; June 13, 1858; May 29, 1870; *T. Morong*, June 25, 1878; *E. & C. E. Faxon*, June 26, 1879); Arlington (*Wm. Boott*, July 18, 1858; June 16, 1861); Arlington and Medford (*F. S. Collins*, July 8, 1887); Cambridge (*Wm. Boott*, July 10, 1859): brackish marsh, Newburyport (*F. F. Forbes*, June 13, 1903).

C. salina Wahlenb., var. **kattegatensis** (Fries) Almq. × **stricta** Lam. Medford (*Wm. Boott*, June 13 and June 20, 1858; *T. Morong*, June 25, 1877); Winchester (*Wm. Boott*, May 22, 1870); Arlington (*Wm. Boott*, June 18 and July 1, 1883; *F. S. Collins*, June 10 and July 8, 1887); Cambridge (*Wm. Boott*, June 11, 1858 and June 2, 1867; *E. Tuckerman*, no date). The Tuckerman specimen was

collected in wet swamps on Fresh Pond, and is in the Gray Herbarium. On the label in Francis Boott's handwriting is "C. vulgaris Fries." Tuckerman wrote on the label " 'very much like some of my foreign specimens of C. stricta.' Torr.! litt. C. stricta vera, fide Greene!" Carey has a long note on the sheet.

C. scabrata Schwein. Swamps, bogs and wet woods. Not reported from northwestern or southeastern towns; eleven scattered stations from Andover to Wrentham.

C. scirpoides Schkuhr. Swamps and meadows, occasional throughout.

C. scirpoides Schkuhr, var. **capillacea** (Bailey) Fernald. No reports from southeast, but frequent elsewhere.

C. scoparia Schkuhr. Open places, very common.

C. scoparia Schkuhr, var. **condensa** Fernald. Occasional in northern two-thirds of district, probably elsewhere.

C. scoparia Schkuhr, var. **moniliformis** Tuckerm. Ipswich (*K. M. Wiegand,* July 6, 1908); Cambridge (*E. Tuckerman,* no date); S. Sudbury (*M. L. Fernald, W. P. Rich* and *E. F. Williams,* June 17, 1902); Dedham (*C. H. Knowlton,* June 13, 1908).

C. seorsa E. C. Howe. Wet woods and swamps; Georgetown, Stoneham, Arlington, Acton, Stowe, Needham, Dorchester, Milton, Norwood, Canton, Randolph, Walpole.

C. setacea Dewey, var. **ambigua** (Barratt) Fernald. Dry open places; scattered stations throughout.

C. siccata Dewey. Dry sandy places; common in northern half; south of Boston and Framingham, reported only from Sharon.

C. silicea Olney. Sea-beaches and sand-dunes from Plum Island to Duxbury; also inland at Andover, Bedford, Concord and Readville [Hyde Park].

C. sparganioides Muhl. Rich woods, rare; Essex County (*Wm. Oakes,* no date); Oak Island, Revere (*H. A. Young,* June 1, 1879, July 9, 1882; *E. & C. E. Faxon,* June 10, 1879); Melrose (*H. A. Young,* June 5, 1879); Shaker Glen, Woburn (*E. F. Williams,* May 30, 1896); "Winchester (C. E. Perkins); Concord (E. S. Hoar); Malden (F. S. Collins)" according to Dame & Collins, Fl. Middlesex Co. 119, 1888 [The Concord specimen of Mr. Hoar's proves to be *C. muricata* L.]; occasional, Blue Hills and Middlesex Fells, according to Deane, Fl. Metrop. Park Comm. 94, 1896.

C. SQUARROSA L. N. Andover, one specimen only, between

Shawsheen and Merrimac, near Sutton's Mills Station (*J. Robinson*, Aug. 5, 1879); waste ground, Cambridge (*W. Deane*, June 27, 1887). Adventive from further west.

C. stellulata Good. Wet open ground, common.

C. stellulata Good., var. **angustata** Carey. Framingham (*E. C. Smith*, June, 1897); cedar swamp, Walpole (*C. H. Knowlton*, June 17, 1908.

C. stellulata Good., var. **cephalantha** (Bailey) Fernald. Many reports from central third of district.

C. stellulata Good., var. **excelsior** (Bailey) Fernald. Frequent from Stoneham, Wellesley and Natick south to Mansfield and Walpole.

C. sterilis Willd. Swamps, marshes and meadows; not reported from western third of district, but doubtless frequent throughout.

C. stipata Muhl. Swamps and wet meadows, common.

C. straminea Willd. Fields, woods and borders of brooks from Sherborn, Sharon and Milton northeast to West Newbury and Plum Island.

C. stricta Lam. Forming tussocks in wet places, very common.

C. stricta Lam., var. **angustata** (Boott) Bailey. Sixteen scattered stations in central part of district.

C. stricta Lam., var. **curtissima** Peck. Malden, Medford, Wilmington, Belmont, Milton, Westwood.

C. stricta Lam., var. **decora** Bailey. Occasional in central part of district.

C. tenella Schkuhr. Moist woods and wooded swamps; Billerica, Concord, Randolph, Dedham, Norwood, Canton, Walpole.

C. tetanica Schkuhr, var. **Woodii** (Dewey) Bailey. Open peat-bog, S. Sudbury (*M. L. Fernald, W. P. Rich & E. F. Williams*, June 17, 1902).

C. tribuloides Wahlenb. Moist fields and woods, frequent in northern half.

C. tribuloides Wahlenb., var. **reducta** Bailey. Cambridge, Belmont, Milton, Norwood, Wellesley or Dover; Mill Dam, Boston or Brighton (*Wm. Boott*, June 5, 1853).

C. tribuloides Wahlenb., var. **turbata** Bailey. Medford, Cambridge, Dedham, Canton.

[C. TRICHOCARPA Muhl. In Dame & Collins, Fl. Middlesex Co. 116, 1888, is the following reference to this species: "Concord (E. S. Hoar; specimen in herb. of); Ashland (Rev. Thos. Morong)." The

specimen collected by the late Edward S. Hoar is in his herbarium which has recently been presented to the New England Botanical Club by his daughter, Mrs. M. B. L. Bradford of Concord, Massachusetts. Examination proves it to be *C. vesicaria* L. The herbarium of Rev. Thomas Morong is in the Herbarium of the New York Botanic Garden at Bronx Park, New York City, and, through the kindness of Dr. J. K. Small, the Ashland plant has been examined and identified as *Carex hirta* L. It was collected in low, grassy ground, on June 30, 1877. I have in my herbarium specimens of *C. hirta* L. collected by Dr. Morong in Ashland, June, 1877, and labelled *C. trichocarpa* Muhl. This is probably of the same collecting as the specimen just referred to. Prof. L. H. Bailey wrote me in 1884 in regard to this plant, "An interesting find. It is *C. hirta* L..... I have not the species from this country, so I took a piece." I also have two specimens of *C. hirta* L. collected by Dr. Morong in Ashland, July 6, 1885. These Ashland plants have been recorded in Rhodora xiii. 250, 1911, under *C. hirta* L.

Prof. Bailey published a note on *C. hirta* L. in the Botanical Gazette for June, 1885, on page 295. He mentions its general resemblance to *C. trichocarpa* and says, "Introduced from Europe. Ashland, Mass., 1877, *Thos. Morong*; in ballast, Philadelphia, 1880, *F. L. Scribner*; and about Boston, *Wm. Boott*. Mr. Morong writes me as follows in regard to this species: 'I have collected it for several years in succession. I first found it by the roadside in rather low lands and afterwards in yards around dwellings, among grass. I presume from these situations that it must have been introduced into this locality.'" *Carex trichocarpa* Muhl. has been found in New England only in the western portions, while *C. hirta* L. has occurred at several stations in eastern Massachusetts (see Rhodora xii. 188, 1910). — W. Deane.]

C. trisperma Dewey. Swamps, meadows and wet woods; apparently frequent, but not reported from southeastern portion.

C. trisperma Dewey, var. **Billingsii** Knight. Wenham, Wakefield, Melrose, Tewksbury, Chelmsford, Littleton, Natick, Duxbury.

[C. Tuckermani Boott. In Dame & Collins, Fl. Middlesex Co. 115, 1888, is the following reference to this species: "Concord (E. S. Hoar, and specimen in Thoreau Herb.)." The herbarium of Edward S. Hoar, including the Carices, among other plants, collected by his intimate friend, Henry D. Thoreau, contains the specimens above

mentioned. The plant collected by Thoreau proves to be *C. rostrata* Stokes. The specimens collected by Mr. Hoar are *C. vesicaria* L., var. *monile* (Tuckerm.) Fernald. I have in my herbarium, a specimen of the same collecting, given me by Mr. Hoar. It, also, is *C. vesicaria* L., var. *monile* (Tuckerm.) Fernald. Mr. Hoar's label reads; "Concord, June 9, 1858. River meadows, very common," a statement well applying to *monile*, specimens of which I have from four separate stations along the Concord River in Concord, collected by Mr. Thoreau and Mr. Hoar. *Carex Tuckermani* is not known to occur in eastern Massachusetts.— W. Deane.]

C. umbellata Schkuhr. Dry sandy and rocky soil, frequent in eastern half of district.

C. umbellata Schkuhr. var. **brevirostris** Boott. Melrose (*G. G. Kennedy*, May 3, 1896).

C. umbellata Schkuhr, var. **tonsa** Fernald. Halifax (*A. S. Pease*, May 30, 1907).

C. varia Muhl. Dry woods and open places, common as far south as Milton and Norwood.

C. varia Muhl., var. **colorata** Bailey. Grassy bank, Wellesley (*K. M. Wiegand*, May 29, 1908); Mt. Chickatawbut, W. Quincy (*J. R. Churchill*, May 20, 1900); Halifax (*A. S. Pease*, May 30, 1907).

C. vesicaria L. Wet meadows, marshes and swamps, frequent.

C. vesicaria L., var. **jejuna** Fernald. Andover (*A. S. Pease*, June 9, 1903); Bedford (*J. Murdoch, Jr.*, June 7, 1902); Framingham (*E. C. Smith*, July 7, 1897); upper meadow, Milton (*J. R. Churchill*, July 17, 1898).

C. vesicaria L., var. **monile** (Tuckerm.) Fernald. Same range as the type.

C. vestita Willd. Sandy or gravelly soil in sun or shade, common.

C. vestita Willd., var. **Kennedyi** Fernald. Near Silver Lake, Wilmington (*G. G. Kennedy*, June 11, 1899). The type station, and the only station known. Published in Rhodora ii. 170, 1900.

C. virescens Muhl. Dry woods and open places, common in central portion.

C. virescens Muhl., var. **Swanii** Fernald. Common in central portion, extending north to Tewksbury and south to Walpole, Sharon, and Wrentham.

C. vulpinoidea Michx. Swamps and moist places, common.

C. Willdenowii Schkuhr. "Above the waterfall on the west side

of the path," Malden [now Melrose]. (*Wm. Boott*, June 11, 1863), also Malden [probably Melrose] (Wm. Boott, June 6, 1853); Arlington (*Wm. Boott*, June 6, 1853); dry woods, Ponkapaug, Randolph (*J. R. Churchill*, June 26, 1897). See RHODORA xii. 187, 1910.

C. H. KNOWLTON
S. F. BLAKE
J. A. CUSHMAN
WALTER DEANE
} *Committee on Local Flora.*

THE ALGAE OF A MARSHY POND.

BY A. B. KLUGH, M. A.

ON Barriefield Common near Kingston, Ontario, is a clay-bottomed marshy pond, whose algal flora is worthy of record because of its richness. This pond is only about 20 yards in diameter and is about 2½ feet deep in the centre. The richness of this pond appears to me to be due to two causes; firstly that the pond never completely dries up, and I have it on the authority of Dr. Knight that during his long residence in Kingston he has never known it to be dry, and secondly that being shallow the water becomes warm during the summer. All the species mentioned below were collected either on July 21st or July 23rd, 1911. On the first occasion only one vial of material was collected, but on finding it so rich I returned on the 23rd and secured four more vials of material.

I wish here to thank Mr. F. S. Collins for his careful examination of such material from this pond as I sent him.

The species listed do not represent the entire algal flora of this pond as I found many species which were not in fruit and consequently not determinable with certainty.

The species marked with an asterisk are those which are here recorded from Canada for the first time.

CYANOPHYCEAE.

**Aphanothece saxicola,* Naegeli. Common.

**Aphanothece microscopica,* Naegeli. Common.

Oscillatoria limosa, Agardh. Scarce.

Oscillatoria formosa, Bory. Scarce.

**Nostoc sphaericum,* Vaucher. Common.

**Anabaena catenula,* Bornet & Flahault. Fairly common.

Scytonema crispum, Bornet. Abundant, floating in great masses. The unbranched form only occurred.

**Tolypothrix tenuis,* Kuetzing. Common and intermingled with the preceding.

**Calothrix stagnalis,* Gomont. Common on *Scytonema crispum.* Young trichomes blue-green, older trichomes from pale blue to lilac in color. Three or four gonidia often present on one filament. Sheaths variable, usually thin but sometimes 3 microns thick.

**Rivularia pisum.* Agardh. Common.

**Rivularia natans,* Welwitsch. Common. Forming spherical colonies from ½ to 3 mm. in diameter attached to water-plants.

HETEROKONTAE.

Ophiocytium cochleare, A. Braun.

Ophiocytium parvulum, A. Braun.

CHLOROPHYCEAE.

**Zygnema pectinatum,* Agardh. Common and just beginning to conjugate.

**Spirogyra crassa,* Kuetzing. Scarce at border of pond.

**Mougeotia sphaerocarpa,* Wolle. Common.

Chlamydomonas communis, Snow. Common.

Gonium pectorale, Muller. Rare.

Pandorina morum, Bory. Common.

Characium naegelii, A. Braun.

Rhaphidium falcatum aciculare, Hansgirg.

Nephrocytium agardhianum, Naegeli.

**Tetraedron minimum,* Hansgirg.

**Tetraedron regulare*, Kuetzing.
**Tetraedron enorme*, Hansgirg.
Scenedesmus bijuga, Wittrock.
**Crucigenia rectangularis*, Gay. Rare.
**Elakatothrix americana*, Wille. Scarce.
**Coelastrum microporum*, Naegeli.
Sorastrum spinulosum, Naegeli. Common.
Pediastrum boryanum, Meneghini. Common.
Pediastrum tetras, Ralfs. Scarce.
**Cylindrocapsa geminella*, Wolle. Very common.
Chaetosphaeridium globosum, Klebahn. On *Cladophora fracta*.
**Gloiococcus mucosus*, A. Braun. Common.

**Gloeotaenium loitlesbergerianum*, Hansgirg. Both four-celled and two-celled forms of this species were present in the collections made both on July 21 and July 23. This is the first record for this species on the North American Continent, the only record previously published for the Western Hemisphere being from Trinidad.

**Cladophora fracta*, Kuetzing. Common.

Queen's University, Kingston, Ontario.

A BLUNT-SPIKED VARIETY OF CAREX SCOPARIA.

M. L. Fernald and K. M. Wiegand.

In eastern Newfoundland much of *Carex scoparia* so strongly resembles *C. tribuloides*, var. *turbata* in its slightly flexuous elongate head of subturbinate almost flat-topped spikes that, when the plant was first brought to notice during the past summer, by Mr. E. B. Bartram who was collecting with us, we were inclined to class it as a form of *C. tribuloides*. But the plant, which afterward proved to be generally distributed in eastern Newfoundland has the narrow leaves, close sheaths and the straw-colored or brownish somewhat lustrous spikes of *C. scoparia*, and is clearly an extreme of that species. Examination of all the material in the Gray Herbarium and the herbarium of the New England Botanical Club — about 250 sheets — shows that

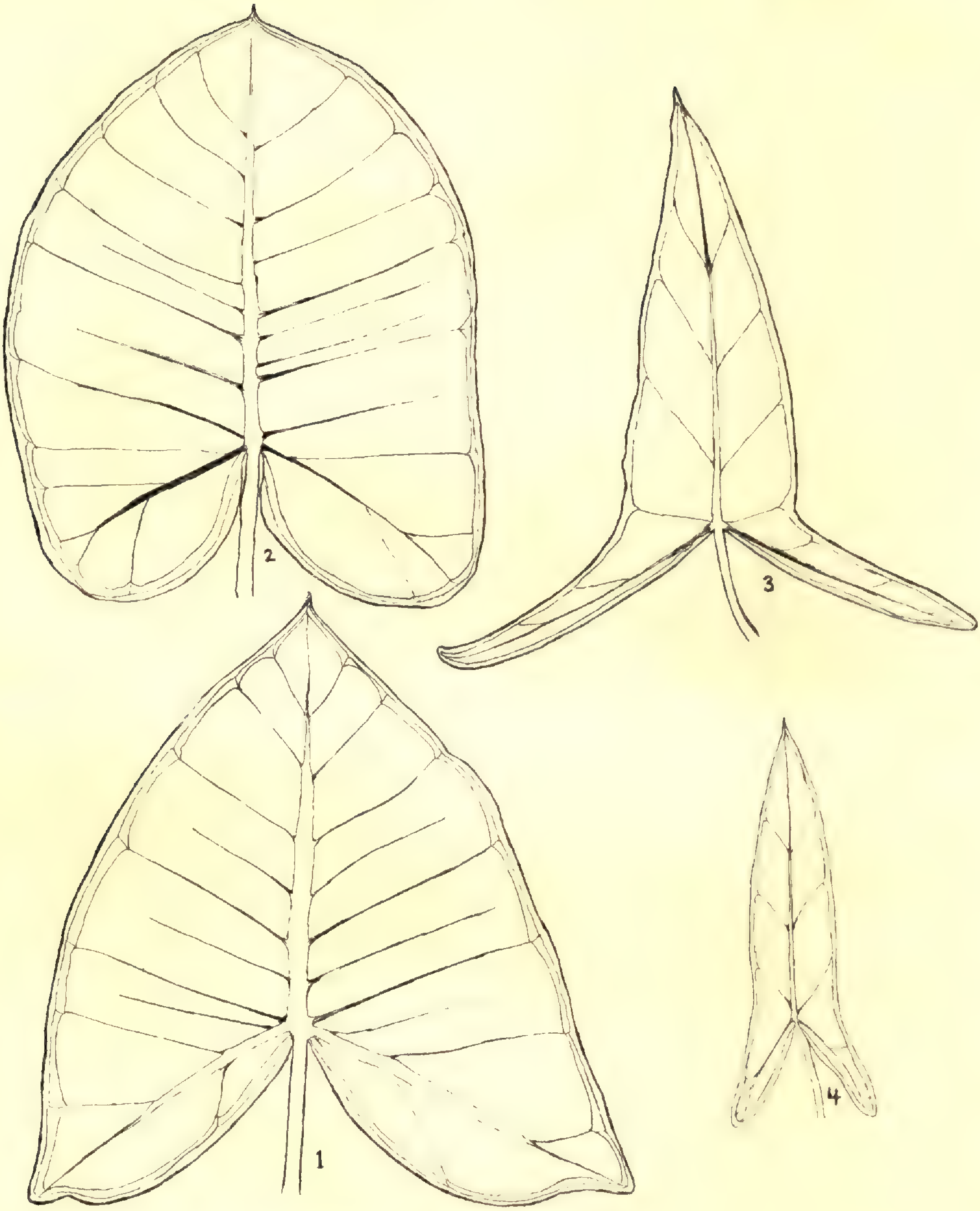
the species and ordinarily recognized varieties have the spikes acute (at least when young) and more or less rhomboid-fusiform, thus strongly contrasting with the blunt or subtruncate obovoid spikes of *C. tribuloides.* In the large suite of material which we have examined there are a few specimens which are clearly like the blunt-spiked plant of Newfoundland and which indicate that this extreme is widely distributed, though apparently rare on the continent of North America. That it may be readily cited we propose to call it: —

Carex scoparia Schkuhr, var. **subturbinata**, var. nov., var. moniliformi habitu statura etc. simile; inflorescentiis elongatis subflexuosis; spicis subremotis obovoideis vel subturbinatus obtusis vel subtruncatis.

Similar in habit, stature, etc. to var. *moniliformis*: inflorescences elongate, subflexuous; spikes subremote, obovoid or subturbinate, obtuse or subtruncate. — Type collected in a wet ditch along the railroad near Rushy Pond, Newfoundland, August 28, 1911, *Fernald & Wiegand,* no. 4796. Also examined from the following stations. Newfoundland: open swale, river-flat, Grand Falls, July 18, 1911, by a pool on sandstone ledges, Grand Falls, July 22, 1911, low open stony ground along a brook, and in a wet ditch along the railroad, Brigus Junction, August 5, 1911, *Fernald & Wiegand,* nos. 4792, 4793, 4794, 4795. Nova Scotia: Metaghan, July 22, 1896, *E. Brainerd.* Michigan: Tawas Point, June 22, ——, *H. Gillman.* Tennessee: low wet places, Henderson, May 13, 1893, *S. M. Bain,* no. 500.

Prize Essay.— We are asked to call attention to two prizes, of $25.00 and $15.00, offered by the Torrey Botanical Club for the best popular article on some feature of the vegetation in the neighborhood of New York (including the State of Connecticut). For details those interested should communicate promptly with Mr. Norman Taylor, Central Museum, Eastern Parkway, Brooklyn, N. Y.

Volume 14, no. 161, including pages 81 to 96, was issued 1 May, 1912.



S. F. Blake del.

FORMAE OF PELTANDRA VIRGINICA.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 14. July, 1912. No. 163

THE GENUS AMELANCHIER IN EASTERN NORTH AMERICA.

K. M. Wiegand.

(Plates 95 and 96.)

It is with some hesitation that the writer attempts a treatment of a genus which in the past has been subject to so much difference of opinion as has *Amelanchier*. His only excuse is that field and herbarium studies covering in a general way a period of sixteen years, but more especially of four years, have led him to conclusions in regard to specific identity, relationship, and nomenclature which differ rather widely from those generally accepted at present.

Between the years 1895 and 1898 the writer made a serious study of the shad-bushes of Central New York with the expectation that the results would be published at once; but on more extended study in herbaria the classification based on the local work was found to accord so poorly with what existed elsewhere that the idea of immediate publication was given up. Recent field work in eastern Massachusetts and also in Newfoundland, where the genus is especially well represented as to individuals, has revived interest in this problem, and much of the writer's spare time throughout the past year has been again devoted to *Amelanchier*. During the summer of 1911, in company with Prof. M. L. Fernald and Mr. E. B. Bartram, he collected in Newfoundland about 132 numbers of *Amelanchier*. This material, together with that in the Gray Herbarium, kindly placed at the writer's disposal by those in authority, and the material in the Herbarium of the New England Botanical Club, has furnished the immediate basis for this

paper. In addition, the writer has seen the material in the Herbarium of the Missouri Botanical Garden, the herbarium of the Philadelphia Academy of Natural Science, the National Herbarium, the herbarium of the New York Botanical Garden, and the herbarium of Cornell University. The principal cause of most of the difficulty experienced by students of *Amelanchier* in the past in drawing specific lines, is to be found undoubtedly in the wonderful variability which seems to exist within the genus, a variability so extreme that rarely did it seem possible to find two plants as much alike as specific identity in other groups would demand. Indeed, if the sheets of any large collection are sorted on any assumed basis, almost as many transitional sheets will be found as sheets typical of the supposed species. For this reason many taxonomists have been inclined to believe that no real specific lines exist, at least so far as the eastern species are concerned. Because of this wealth of form two courses have seemed possible; a conservative treatment in which a very few species, sometimes only one, may be recognized; or a radical one in which a great many species are supposed to exist.

In attempting any treatment of the genus the first point to be decided is the significance of this wealth of form. In the past it has been usually interpreted as real variation, and, if such, we must admit that to draw specific lines would be impossible. Recent activity in the study of heredity has shown, however, that hybridization in nature, especially in certain groups, is much more common than was supposed. Moreover, the Mendelian theory has supplied a method of testing supposed hybrids by growing the offspring through several generations. By means of such tests it has been shown in many cases that so-called intermediates are due to hybridization. It has also been shown that many so-called intermediates are really not intermediates as far as the individual characters are concerned, but are made up of the characters of the two parents combined according to the law of combinations and permutations until all possible combinations exist. The question may be legitimately raised, therefore, as to whether the multitudinous forms in *Amelanchier* are hybrids, and, if so, as to what are the true species.

The writer began the present study under the belief that the wealth of form was due to true variation; but with more material at hand, and especially in recent years since the possibility of hybridization has been more in mind, a surprisingly great number of cases has been

found where characters plainly appear to have been recombined. So frequent have these cases become that it seemed desirable to work out a treatment of the genus based on the idea that the so-called "intermediates" are hybrids. The present paper is a result of this endeavor. The first and most difficult problem was to determine what were the real species, and what the hybrids. At first too few species were recognized, thus making necessary the interpretation of some plants as hybrids in regions where at least one of the parents was not known to exist.

After several trials, however, the present treatment was settled upon for the following reasons: because the groups of sheets representing each species obtained in this way seemed to be natural groups the individuals in which differed not more from each other than do individuals in species of other genera; because the range of each species so obtained was a natural range, and not local; because most intermediate specimens could be interpreted as recombining characters of the true species; because all characters were accounted for, so that supposed hybrids simply recombined old characters, and no new characters appeared in these intermediates; and because the range obtained was such that hybrids were not accredited to regions in which the parents did not exist. Unfortunately the time required to grow plants of *Amelanchier* in order to test the hybrids, and the fact that the writer is not conveniently located for such work, has made it impossible to test the hybrids assumed to exist. This paper must, therefore, be regarded as a provisional treatment based upon the *hypothesis* that the products of hybridization within this genus are extremely common. Indeed, such products of hybridization seem so common that in every large herbarium thus far studied the number of sheets to be considered of hybrid origin is about one-third of the whole. This great number of hybrid forms may seem to some unduly large when it is considered that Mendel [1] and others have shown that, in nature, there is a strong tendency for the gross mass of individuals representing species and hybrids to return to the two specific forms. It may seem that we are assuming unreasonably frequent crossing to occur. It is probable, however, that many forms which are the results of hybridization come true to seed. That certain new forms thus produced may come true to seed is not opposed to the Mendelian

[1] Mendel: — See Mendel's Principles of Heredity, by Bateson, p. 58, 1902.

theory of segregation as would at first seem to be the case. According to the Mendelian theory, all unit characters tend to segregate with successive generations produced from a hybrid, and to return to the pure parent form, but this does not mean that this ultimately pure character will necessarily be combined with another ultimately pure character from the *same parent.* In many cases there will be a combination of an ultimately constant character of one parent with a similarly constant character of the other parent so that all the resulting offspring in succeeding generations will be alike and will possess both of these characters. As the ordinary expression goes, it will be a permanent hybrid, and thus a new race will be established. Whether we should attempt to distinguish all of these new races by names, or simply refer to them as hybrids of "so and so" in which "such and such" characters of each parent are represented, is an open question. Considering the uncertainty, without culture, as to whether the various supposed hybrids breed true or not, it has seemed to the writer greatly in the interest of clearness to refrain from giving them names.

Thus the present treatment will still be disappointing to those who, like most of us, would like to be able to refer every specimen to a definite category. The writer believes, however, that this may be more nearly accomplished under the present treatment than under any other method of treating *Amelanchier* of which he is aware. We now have eight well defined categories bearing specific names. Other specimens which do not fall into these may be definitely labeled as hybrids [1] between some two of these parents. If the hybrids were described as species, a very large number of categories would be required to represent the various Mendelian combinations, and thus these categories themselves would differ from each other to such a slight degree as to render the classification unusable in actual practice. *Amelanchier,* like *Rubus,* is a group in which it will never be possible to have the clearly cut condition found in so many genera where specimens will fall easily into one or another specific category.

[1] The word hybrid is here used in a sense, common in taxonomy, but differing from that adopted by the modern plant breeders. It signifies any individual which is the result of crossing and which presents some of the traits of one parent side by side with some traits of the other parent. It may or may not breed true. The Mendelian students, on the other hand, use the term *hybrid* to denote an individual of the Dr group, which will not breed true but which will segregate in successive generations.

Incidentally it may be interesting to note here that some relation seems to exist between the frequency of crossing and the disturbance of natural conditions. Hybrids of both *Amelanchier* and *Rubus* seem more abundant in places where recent fires or recent clearing of the land have disturbed the equilibrium of nature. The frequently dug-over railroad embankment is an especially favorable locality for such hybrids in *Rubus*.

If it is difficult to determine what are species and what are not species in the genus *Amelanchier*, it is no less difficult to determine what names should be applied to the species recognized. Synonymy here is very extensive and very much involved. It is complicated by the fact that many of the species of the earlier authors were undoubtedly aggregates, and also by the fact that several specific names were based upon material from European gardens unlike any species now known to grow in the wild state. There is also some reason to believe that a few names were based upon hybrid specimens. It must be understood, therefore, that the nomenclature of the group, even after the present attempt to straighten it out, is still in an unsatisfactory state. The old types especially, if in existence, must be critically studied from the standpoint of the present treatment. A very serious attempt has here been made to interpret the older specific names; but, when that has seemed impossible, so that the retention of the name would demand an arbitrary application, thus creating a "permanent source of confusion and error," [1] the name has been dropped.

The first name to be considered in connection with *Amelanchier* in eastern North America is the *Mespilus canadensis* of Linnaeus.[2] The original description is very brief and reads: "MESPILUS inermis, foliis ovato-oblongis glabris serratis, caule inermi.— Mespilus inermis, foliis subtus glabris obverse-ovatis. *Gron. virg.* 54. *Habitat* in Virginia, Canada." The reference in Gronovius reads as cited with the additional statement: "Frutex Mespilo affinis humilis, non ramosus nec aculeatus, foliis alternis subrotundis, eleganter serratis, & ad apicem rotundis, ... *Clayt. n. 60 & 295.*" In the Systema Veg. ed. 13 (p. 388, 1774) Linnaeus says:— "M. inermis, fol. ovato-oblongis glabris serratis acutiusculis. *Tenera lanata; adultior nuda. Racemi*

[1] Internat. Rules Bot. Nom., Art. 51, sect. 4.
[2] Sp. Pl., ed. 1, p. 478 (1753).

elongati." The citation from Gronovius, it would seem, can apply only to one or both of the two shrubby species growing in Virginia, both of which have rather blunt leaves and fine teeth, namely *Amelanchier oblongifolia* or *A. stolonifera*. Although "foliis subrotundatis" would seem to refer to *A. stolonifera*, a small-leaved plant of *A. oblongifolia* might have been at hand. The writer is indebted to Miss Alice Eastwood for a search among Clayton's plants in the British Museum, but these numbers could not be found. The reference seems, therefore, of little value in determining the Linnean type. The words "foliis ovato-oblongis" in the original description suggest quite another plant from that suggested by the Gronovian reference, and the words "ovato-oblongis . . . serratis acutiusculis, racemi elongati" in the Systema still further suggest one of the arborescent species. That the hairy one of these two tree forms (*A. canadensis*, var. *tomentula* Sarg.), not the smooth one, was intended is made plain by the words "*tenera lanata.*" The writer is also indebted to Miss Eastwood for a comparison of material representing our various East-American species with the only existing specimen labeled *Mespilus canadensis* in the Linnean Herbarium. Quite unprejudiced by previous knowledge of the case, she reports that the Linnean specimen is more like material numbered III by the writer which was taken from a specimen of the hairy arborescent form; thus the Linnean descriptions and the specimen suggest the same plant. The writer feels, therefore, that the type of Linnaeus' *M. canadensis* is reasonably well determined to be what has recently passed as *Amelanchier canadensis*, var. *tomentula.* This Linnean conception of *A. canadensis* was indeed quite generally followed by nearly all of the earlier writers, except Bigelow, in the various genera under which it was placed. Linnaeus, the younger, in 1781 (Suppl. p. 255), substituted the name *Pyrus Botryapium*, adding to the description the words "*Arbor*. . . *Folia*. . . juniora tomentosa. . . *Petala* lineari-lanceolata. . .," thus making still more definite the conception of the arborescent hairy form. Only the description of the fruit as blue-black, juicy, sweet and pleasant is at variance with this interpretation. This (that Linnaeus meant the tree with pubescent leaves) was also the interpretation of Torrey & Gray in the Flora of North America (but not always that of Torrey, as shown by specimens in the Torrey Herb. which are mostly *A. laevis*). In the early editions of Gray's Manual, however, there seems to have been a tendency, while retaining the name *A. canadensis* for

the form which is woolly when young, to apply the term "var. *Botryapium*" to a form with "leaves soon smooth." This is exactly opposite to the view recently held. A definite transfer of the name *canadensis* to the arborescent smooth species seems to have first taken place in the sixth edition of Gray's Manual. Since then this latter interpretation has been quite generally followed.

Amelanchier canadensis as interpreted by the writer seems to be the more common arborescent species in the Middle and Southern States, and, since this region furnished much material to the earlier botanists, it is not surprising that this species has an extensive synonymy. The writer has been unable to attribute any of the numerous published names to our smooth species, which is more common in the north, since each description states explicitly that the leaves were hairy when young. This smooth species is, therefore, here given the new name *A. laevis*.

Greater difficulty is experienced in the determination of names applicable to the shrubby species of *Amelanchier*. The shrubby and arborescent species were not clearly distinguished by the early authors, and in many cases the descriptions were so worded as to include both. Two names appear in the early synonymy of *Amelanchier* which have since been variously applied to different shrubby or even arborescent species. These are the *Crataegus spicata* of Lamarck,[1] and the *Pyrus ovalis* of Willdenow.[2] Both were described from garden material. The *C. spicata* was based on plants growing in the Jardin du Roi, and the *P. ovalis* on plants in the Berlin Garden. Plants have since been growing in the Berlin Garden, specimens from which have been from time to time sent out in exsiccati as *Amelanchier ovalis* or *A. spicata* (E. Koehne — Herb. Dend. No. 51 as *A. spicata* Hort. bot. Berol.) Those who have seen these specimens and the type specimen of *Crataegus spicata,* as well as specimens of our Eastern American stoloniferous fine-toothed *Amelanchier* agree that they all appear to be one and the same thing. Flowers and leaves in the exsiccati match those of this stoloniferous species as well as one could wish, as do also the flowers and leaves in the original descriptions. The original description of *C. spicata,* however, gives the height of the plant as from two to three times that of the native European species of *Ame-*

[1] Encyc., i, p. 84 (1783).
[2] Berlin Baumz., ed. 1, p. 259 (1796).

lanchier, which, figured out, would mean about 2–5 m. Willdenow gives the height as 2–2.5 m. In addition, Mr. Alfred Rehder has stated to the writer that the plant in European gardens commonly passing under the name *A. ovalis* is not low and stoloniferous but tall and fastigiate. It seems very reasonable to believe therefore that the plant imported at that early period and propagated in the European gardens was a constant form, of hybrid origin, in which the leaf- and flower-characters of *A. stolonifera* were combined with the habit of *A. oblongifolia.* For this reason both of these names have been considered as invalid for any species described in this paper.

Another name which has recently been taken up for an apparently artificial group of forms belonging to various species and including hybrids, is the *Amelanchier intermedia* of Spach.[1] This, also, was described from garden material ("...n'est pas rare dans les jardins. Elle est sans doute originaire de l'Amerique septentrionale"). The original description, which is lengthy, suggests the arborescent hairy species; "...les jeunes (feuilles) laineuse...Lanières calicinales... réfléchies après anthèse,...Petit arbre. Rameaux divariqués... Pétales longs d'environ 6 lignes...," although the description of the leaf and of the form of the sepals is not very good for that species. In the Gray Herbarium, however, there is a specimen named *A. intermedia* by Spach himself. This is a sprig of flowering material and hence imperfect. The hypanthium is rather large for *A. canadensis,* and the sepals, though abruptly reflexed, are mostly longer and narrower than would be normal for that species. In one flower however there is a suggestion of the broad sepals of *A. canadensis.* Both the acute leaves and reflexed sepals exclude *A. oblongifolia.* The specimen should be interpreted, probably, as either an extreme form of *A. canadensis* or a hybrid of that species with *A. laevis.*

If we begin now with the shrubby species with coarse teeth we find that in 1803 Michaux described a *Mespilus canadensis γ rotundifolia*:[2] "arborescens; foliis sub-orbiculata-ovalibus, utrinque rotundatis.—in Canada." The identity of this variety of Michaux has long been in doubt, and the name has been used by various authors for quite different plants. The original description is exceedingly brief and very indefinite. The word "arborescens" suggests something taller than a shrub, but Michaux used the term "arborea" on the same

[1] Hist. Veg. Phan., ii. p. 85 (1834).
[2] Fl. Bor. Am., i. p. 291.

page for var. *cordata*, and "fruticosa" for var. *oligocarpa*, so that "arborescens" might signify a high shrub. The writer has had access to a photograph made by Prof. Fernald of the Michaux type specimen in the Michaux herbarium (Mus. Hist. Nat. Paris) which, though not conclusive, seems more like the large-flowered, coarse-toothed species than any other; and this interpretation seems to have been that reached by other recent botanists who have studied the type. The Michaux variety was raised to specific rank and transferred to *Amelanchier* by Roemer [1] in 1847. Unfortunately in 1814 Pursh described a *Pyrus sanguinea*.[2] There has always been doubt as to the identity of this plant; and, so far as known, no specimen is in existence. Pursh cites as the only synonym the *M. canadensis* γ *rotundifolia* of Michaux, but he further says "tenuissime serratis...A small tree...berries red..." which are not the characters of Michaux's plant. Moreover the locality is given as, "In Canada and on the banks of the Columbia." Since that time attempts have been made to apply Pursh's name, but in a most diverse manner (see Lindley in Bot. Register t. 1171, and Loudon, Arb. et Fruct. p. 875). Evidently Pursh confused at least two plants, and evidently the only thing definite in connection with the Pursh name is the Michaux synonym, but that is definite and the name need not be a source of confusion; therefore the writer is inclined to believe, with Dr. Britton, that Pursh's specific name should be retained for Michaux's plant. Even if Pursh's name is not used, the name *rotundifolia* cannot be used as a specific name for our plant, as it is an earlier valid name for the native European species.[3]

The dwarf stoloniferous species with coarsely toothed leaves seems never to have been definitely recognized. In literature and in the herbarium it has been confused, sometimes with the species here called *Amelanchier sanguinea*, and sometimes with that here called *A. stolonifera*. The description of Blanchard's *A. erecta* [4] at first glance

[1] Fam. Nat. Syst. Rosif., p. 146.

[2] Fl. Am. Sept., p. 340.

[3] There is said to be a specimen of "*A. alnifolia*," which went through Pursh's hands, in the Lewis and Clark set at the Philadelphia Academy of Natural Science. If so, this may have given rise to the entry in Pursh's flora of the Columbia River locality. But since the specimen is reported not to have been named by Pursh, and since there is no reference in the Flora to this specimen, it is simply an inference that this specimen represents the *Pyrus sanguinea* of Pursh's Flora. (See Robinson & Greenman, in Thos. Meehan, Proc. Acad. Nat. Sc. Philadelphia, Jan., 1898).

[4] Torreya, vii. p. 101.

suggests this species; especially that part in which the flowers are described as small, in close stocky racemes, with short stocky calyx-lobes which are "reflexed-curled," and in which the plant is said to grow in colonies forming a thick hedge. The teeth of the leaves are described as coarse, which would indicate that it belonged to the present group. In reply to a letter in regard to the type, Blanchard writes that the specimens distributed by him may be taken as typical. The Blanchard specimens named *A. erecta* in the Gray Herbarium are quite diverse, both as to size of flowers and venation of the leaves, as well as to other details of general appearance. None of them from Vermont, the type region, have exactly the same leaf and inflorescence as our specimens of the dwarf species from elsewhere. The broadly oval, coarsely toothed leaves, mentioned in the description and seen in the specimens, suggest *A. sanguinea,* as do also the long pedicels and moderately long sepals. Except in one specimen, the petals also are somewhat longer than is typical of our species. The more irregular veins of Blanchard's plants suggest *A. stolonifera* or *A. laevis,* while the small flowers also suggest *A. stolonifera.* The height given (4–12 ft.) is greater than is to be found among typical plants of the present species farther westward. If Blanchard's North Westminster plants were of this species, they would extend the eastern range slightly, since we have no other specimens from east of Troy, New York, and northern Lake Champlain. All things considered, therefore, the name *A. erecta* seems of too questionable application to warrant its adoption for our plant. It is thus desirable to give the species a new name, and *A. humilis* has been chosen because of the low dwarf habit of the shrub.

In 1818 Nuttall[1] described *Aronia alnifolia* with a range given as from Ft. Mandan to the Andes, but otherwise no definite locality was cited. The description calls for a small leaf, rounded and toothed near the summit, somewhat acute at the base, and smooth at maturity. This might apply to a small leaved specimen of what is here called *Amelanchier florida,* but the leaves in that species are almost never acute at the base. It might, also, be one of several of the small-leaved western species recently segregated by Greene and others. In the Torrey herbarium there is a small fragment bearing four leaves and a bud, which bears the label, in Nuttall's hand, "Amelanchier

[1] Gen. Am. i. p. 306.

alnifolia R. Mts. a low shrub. The racemes long and erect." On it Dr. Gray has written, "Nuttall must mean his A. pumila for this." Those leaves are about 22–27 mm. long, are rounded at both ends or but slightly cuneate at the base, and there is some slight indication of tomentum still remaining. In the Herbarium of the Academy of Natural Sciences at Philadelphia there is a fragmentary specimen from the "Columbia River" labeled *Amelanchier alnifolia* Nutt. in Nuttall's handwriting. The summit of the ovary in this specimen is glabrous and the specimen may be *A. Cusickii* Fernald. At least, we are not warranted in saying that it is the same as the plant east of the Rocky Mountains. The writer sees no way of deciding what either of these plants really is, or what Nuttall had in mind when describing *Aronia alnifolia.* Unless more material named by Nuttall can be found, it seems impossible to make use of his name. The first name that does definitely apply to our present species is the *Amelanchier florida* of Lindley,[1] published in 1833. This was accompanied by a fine colored plate and a long description with notes. Both the plate and the description, but more especially the former, fit our plant very well indeed. There seems little if any doubt that Lindley had in mind the plant here called *A. florida,* and the Lindleyan name is, therefore, adopted for the plant under discussion.

The stoloniferous coastal species of dry soil has never received a distinctive name. It has passed variously as *Amelanchier oblongifolia, A. spicata,* and *A. ovalis;* but the first of these is a quite different plant, and the other two names have already been shown not to apply to any species known at present. In recent years it has formed the basis of the *A. spicata* of Britton's various works. Since no other valid name exists for the species it may be called *A. stolonifera* because of its peculiar habit.

The swamp species with alder-like habit has been very generally confused with other species. It seems to have constituted all of Ashe's[2] "*obovalis*" and a part also of Michaux's.[3] It was the *Pyrus ovalis* of Bigelow and Pursh, and the *Aronia ovalis* of Torrey's Flora of the Northern and Middle States. It constituted a part of the *Mespilus arborea* of Michaux, and of the *Amelanchier intermedia* of Britton's N. A. Trees, as well as a part of the *A. Botryapium* of Britton's

[1] Bot. Reg., t. 1589.
[2] Bot. Gaz., xxxv. p. 434.
[3] Fl. Bor. Am., i. p. 291.

Illustrated Flora and Manual. Its earliest distinctive name was the *A. Canadensis β oblongifolia* of Torrey and Gray.[1] Though the description is not distinctive, the specimens thus labeled in the Torrey Herbarium are fairly conclusive. There are two such lots of labeled material with foliage, and one with flowers only. The identity of the latter is uncertain, but of the other two, one is straight *A. oblongifolia* as here understood (Princeton, June, 1831); while the other bears two branches, one of which, a mere twig in flower only, is *A. humilis* (coll. Gray, Watertown, N. Y., 1833), and the other, which is a foliage specimen, is true *A. oblongifolia* (N. Carolina). The significance of the name *oblongifolia* is, therefore, fairly clear and the name should be applied to our plant. It was transferred to specific rank by Roemer in 1847.

In 1803 Michaux[2] described *Mespilus canadensis δ oligocarpa*, with habitat "in America boreali," and characterized as "fruticosa: foliis oblongo-ovalibus, basi acutis, subtiliter serrulatis, brevi petiolatis: fructibus subsolitariis." This name has usually been interpreted as referring to our northern short-petioled few-flowered species, and this interpretation is undoubtedly correct, as shown by a photograph of the Michaux type made by Prof. M. L. Fernald. The type specimen is in the Michaux Herbarium at the Museum d'Histoire Naturelle, Paris, and a print of the photograph is in the Gray Herbarium. This varietal name of Michaux was not raised to specific rank, however, until 1847 (Roemer); meanwhile Tausch[3] had published his *Pyrus Bartramiana* in 1838. The identity of this latter plant has always been uncertain, though the original description very strongly suggested *Amelanchier oligocarpa*. It was based upon material in the Leibnitz garden grown from seed sent by Bartram from North America. In the Bernhardi herbarium at the Missouri Botanical Garden there are three sheets which bear very old printed labels on which are the names *Pyrus Neumanniana* Tausch, *Pyrus Wangenheimiana* Tausch, and *Pyrus Bartramiana* Tausch, and through the kindness of Professor Trelease the writer has had access to these sheets. These specimens are probably part of the original Tausch exsiccati cited in the original description as "Dendroth. exot.-boh. exs." and, therefore, should probably be considered as authentic. The specimen labelled *Pyrus*

[1] Fl. N. A., i, p. 473.
[2] Fl. Bor. Am., i. p. 291.
[3] Flora, xxi, pt. 2, p. 715.

Bartramiana bears also the additional information, "*Aronia praecox* Neumann, Bartrams Birnstrauch, Nordamerika, Zierstrauch. Blüht in Mai. Reift in August," and is pure unhybridized *Amelanchier oligocarpa* of the most typical sort. Tausch's name, being the earliest specific name, must be accepted for this species, which therefore becomes *A. Bartramiana* (Tausch) Roemer. Only one other synonym exists for this species, namely the *A. arguta* Nutt. described by Britton [1] from a sheet so named by Nuttall (collected on Mt. Wachusett, Mass.) and from material collected by Eggleston in Vermont (see Eggleston in Torreya, 5, p. 107, 1905). Eggleston states that the description was mainly taken from his No. 1119, Cedar Swamp, Fairhaven, Vermont, and Nos. 1960 and 1964, Blueberry Hill Bog, Rutland, Vermont. In the Gray Herbarium there is a duplicate type in Nuttall's handwriting labeled "*Amelanchier* * *arguta*, White Mts., N. Hampshire, also on Wachusett Mt., Mass." This and the type specimen, which, through the courtesy of the New York Botanical Garden, the writer has also seen, are apparently in no way different from typical *A. Bartramiana*. The half-grown fruit is ellipsoid-ovoid as in *A. Bartramiana* when of the same age, and the sepals are fully 4 mm. long (4–5 mm.), not 2 mm. as Eggleston says. Eggleston's No. 1119, a portion of which is also in the Gray Herbarium, does have sepals about 2 mm. long and fine teeth on the leaves, but his Nos. 1960 and 1964 have sepals about 3 mm. long and the teeth as coarse as in ordinary *A. Bartramiana*. No essential difference in the shape of the fruit, which is young in all specimens, could be detected between the Eggleston specimens and *A. Bartramiana*. In the light of extended experience with the variation in the shape of fruit, size of calyx, and coarseness of leaf serration of this species in Newfoundland, the writer cannot but feel that in the present case the slight variation in the fruit, on which much emphasis has been placed, is of very minor importance. Moreover, there is a possibility that some of the Eggleston numbers above cited are hybrids with *A. laevis*. Some hybrids between these two parents have been collected from these same Vermont bogs. It seems best, therefore, to consider *A. arguta* a synonym of *A. Bartramiana*.

In addition to the above names which have been proposed for the East-American species of *Amelanchier*, the following names are in existence and should be briefly considered.

[1] Manual, ed. 3, p. 1076 (1907).

In 1783 Lamarck [1] described *Crataegus racemosa.* Various portions of the long description seem to exclude all the species except *Amelanchier canadensis.* The portion of this description which calls for a shrubby habit and leaves glabrous beneath at maturity suggests either an extreme form of *A. canadensis* or a hybrid of this species with some other. This name does not, therefore, in any case, affect the valid nomenclature of our species.

In 1785 Marshall [2] described *Mespilus nivea.* Various characters in the description exclude all species except *Amelanchier canadensis* and *A. oblongifolia.* The writer finds himself unable to decide which of these species was intended. If the plant was *A. oblongifolia* then this would be an earlier name for that species.

In 1796 *Crataegus amoena* was proposed by Salisbury [3] in place of the *Mespilus canadensis* of Linnaeus. No description was given, but simply the citation of the Linnean synonym.

In 1803 Michaux [4] published *Mespilus canadensis α obovalis* from "Carolina inferiore." The description is very brief and the type specimen has not been seen by the writer, but various circumstantial evidences point strongly toward *Amelanchier oblongifolia* as the species intended. The description says "humilior; foliis oblongiuscule obovalibus." This statement, combined with the statement of Ashe that *A. obovalis* (i. e., *A. oblongifolia*) is the plant to be expected along the coast through South Carolina, suggests an identity with *A. oblongifolia.* A photograph made by Prof. M. L. Fernald of the type specimen is less reassuring. The label bears the inscription "abriss. de deux pieds de haut. Carolines," which suggests *A. stolonifera;* and while one twig bears the hypanthium of *A. stolonifera,* another twig has petals like *A. oblongifolia,* and a third twig bears leaves which might belong to either species, though typical of neither. The identity of Michaux's variety, therefore, still remains doubtful.

In 1803 Michaux described also *Mespilus canadensis β cordata.* The description, "arborea: foliis cordato-ovalibus, conspicue acuminatis," very strongly suggests *A. canadensis,* and a photograph of the type specimen made by Fernald leaves no doubt that this is the proper interpretation. *A. canadensis* is, of course, the earlier name.

[1] Encyc., i. p. 84.
[2] Arbust, p. 90.
[3] Prod., p. 357.
[4] Fl. Bor. Am., i. p. 291.

In 1810 *Mespilus arborea* was described by Michaux.[1] The long, detailed descriptive account and the plate leave little doubt that his plant was the *M. canadensis* of Linnaeus. This account is, in fact, the best one of this species in literature. With the exception of the rather sweeping statement that the species is found throughout the United States (which, of course, in those days meant the Eastern United States) as well as in Canada, except in the lower parts of the two Carolinas and in Georgia, the original description seems to describe only typical *Amelanchier canadensis.* Michaux's statement of range must have included *A. laevis* either inadvertently or because of a lack of familiarity with the shad-bushes of New England.

In 1825 *Aronia subcordata* Raf. and *Malus microcarpa* Raf. were published by DeCandolle[2] as possible synonyms of his *Amelanchier ovalis β subcordata* ("Aronia subcordata Raf.? in litt. Malus microcarpa Raf! dec. (v. s.)." *A. ovalis β subcordata* of DeCandolle was probably *A. canadensis*, and therefore the Rafinesquean names become synonyms of the Linnean species.

In 1836 a plant was described from northern Kentucky by Riddell[3] under the name *Aronia latifolia.* From the description one would judge this to have been *Amelanchier sanguinea;* but there exists a small flowering specimen in the Torrey Herbarium at the New York Botanical Garden which from handwriting and locality is undoubtedly a duplicate type. After considerable study the writer is inclined to believe this specimen to be a hybrid of *A. humilis* with *A. laevis.* This interpretation seems reasonable, too, because no specimens of *A. sanguinea* have been seen by him from either Kentucky or southern Ohio.

In 1838 Tausch[4] described *Pyrus Neumanniana* and *P. Wangenheimiana* based on material growing in the Leibnitz garden at Prag. These two names have long been a puzzle to botanists. The two sheets already referred to as in existence in the Bernhardi Herbarium at St. Louis are, therefore, of great importance in this connection. According to the writer's judgment they are both hybrids. The hairy petioles and peculiar teeth, as well as leaf-apex, of the mature leaves on the specimen labeled *P. Wangenheimiana* suggest *Amelanchier*

[1] Hist. Arb. Am. Sept.
[2] Prod., ii. p. 632.
[3] Sup. Cat. Pl. Ohio, p. 24.
[4] Flora, xxi. pt. 1, Beibl. p. 76, and pt. 2, p. 714.

canadensis; but the texture and general outline of the mature leaves, the lack of dense tomentum at flowering time, and the long narrow sepals suggest *A. laevis.* It is probably a hybrid of these two species. The specimen labelled *P. Neumanniana* seems to be a hybrid of *A. Bartramiana* with some other species. The acute leaf-base and general outline suggest *A. Bartramiana,* while the long petioles and the teeth suggest possibly *A. laevis.*

In 1908 Britton [1] described *Amelanchier alabamensis* from material collected by F. S. Earle and C. F. Baker three miles south of Auburn, Alabama. The writer has seen this material which was distributed by Earle and Baker, both the type specimen and also that which was sent to several other herbaria, but is still unable to form any satisfactory opinion regarding it. At flowering time the young leaves, hypanthium and sepals are like *A. canadensis,* but the summit of the ovary is hairy. The mature leaves are not distinctive but are more like those of *A. canadensis.* Nowhere in any of the herbaria studied by the writer are there other specimens which will match these. Thus one is strongly forced toward the opinion that *A. alabamensis* is not a good species of the same grade as those with wide distribution, and that it is to be explained as a local hybrid or as a local environmental variety. Before this conclusion is finally reached however, a more extended search in the Southern States should be made, for this region is one from which little material of *Amelanchier* finds its way into the herbaria.

1907 Blanchard [2] described *Amelanchier saxatilis,* and in the Gray Herbarium there are duplicates of the type (*Blanchard,* Rocky bank of Connecticut, Bellows Falls, Vt., near Depot, 1907, Set. 1, type). These plants are very difficult to understand, for they are not typical of any species recognized in this paper. They may possibly represent a hybrid between *A. laevis* or *A. canadensis* and *A. humilis* or *A. stolonifera.* There is, however, a suggestion of *A. Bartramiana* about the plant, as seen in the dentation of the leaves, in the shape of the young fruit and of the calyx, and in the enlarged base of the style. This plant needs more study in the field.

In 1908 Robinson [3] described *Amelanchier oblongifolia,* var. *micropetala,* a form with small narrow petals, from the Blue Hills in eastern

[1] N. A. Trees, p. 439.
[2] Torreya, vii. p. 99.
[3] Rhodora, x. p. 33.

Massachusetts, from Nantucket, and from several localities in Connecticut. Since then apparently the same form has been collected by F. S. Collins at Eastham, Massachusetts. These forms certainly are perplexing. After a study of the herbarium material and of the plants growing on the Blue Hills the writer is inclined to believe that the small-flowered forms are hybrids between *A. oblongifolia* and *A. stolonifera.* The reasons for this belief are as follows:— 1. Both species grow upon the Blue Hills (*A. oblongifolia* in the damp pockets). 2. Many plants on the Blue Hills otherwise similar to the micropetalous plants have larger petals. 3. The micropetalous plants there differ considerably in foliage. 4. In the majority of such micropetalous plants the foliage is more like that of *A. stolonifera* as to the number of the veins. 5. The herbarium specimens, collected in the Blue Hills, and having small petals, may be sorted into two piles, one with the coarser teeth of *A. stolonifera* and the other with the fine teeth of *A. oblongifolia.* 6. The very globular young fruit of most of the micropetalous plants, on which there is a very short hypanthium, is exactly like that of *A. oblongifolia.* 7. The summit of the ovary is usually glabrous like that of *A. oblongifolia.* 8. On the Blue Hills the plants grow in various soils: either on exposed dry rocks with *A. stolonifera,* or in damp pockets accompanied by typical *A. oblongifolia;* on Nantucket, according to Bicknell they grow "in low grounds about the borders of swamps as well as on the dry moorland and in pine barrens." One of the Connecticut plants was from "dry ground," another from "thin soil on ledge of rocks," and another from "dry sandy soil." This suggests a possible Mendelian combination of dry and wet soil preferences. 9. Both Dr. Robinson and Mr. Bicknell have said that "intermediate" forms occur between var. *micropetala* and *A. oblongifolia.* These might well be other Mendelian combinations. Intermediates of this kind are certainly quite numerous on the Blue Hills. 10. On these hills the plants are low, but while some have the stoloniferous habit of *A. stolonifera,* others have the cespitose habit of *A. oblongifolia.* 11. The summit of Great Blue Hill has been recently cleared and in some places burned, a condition which in Maine seems especially favorable for hybrids of *Rubus,* and in Newfoundland for hybrids of *Amelanchier.* 12. Between *A. oblongifolia* and *A. stolonifera* a distinguishing feature, in most cases, is the narrowness of the petals in the former species and the broadness in the latter species. There is often, also, in *A. oblongifolia* a tendency

toward reduction in the size of the petals. May not the small narrow petals of var. *micropetala* be the *oblongifolia* character intensified by crossing?

The micropetalous plants of Nantucket have recently (1911) been separated from those of the Blue Hills by Bicknell [1] under the name *A. nantucketense.* The writer can find in Bicknell's account little of diagnostic value to separate the two forms. Only the following statement by Bicknell seems distinctive: "I have not been able to convince myself that the low and small-flowered Juneberry which finds its home on ledges and exposed rocky places is the same as the seemingly very local and coastwise Nantucket shrub." The small-flowered Nantucket plant, like the small-flowered plants of the Blue Hills, seem more reasonably explained as hybrids of *A. oblongifolia* and *A. stolonifera.* In the series of Mendelian segregates the swamp character may be supposed to have been derived from *A. oblongifolia,* as was also the character of the glabrous summit of the ovary. The small narrow petals may represent an intensification of the *oblongifolia* type of petal as suggested in case of the Blue Hills form. The calyx lobes of *A. nantucketense* are described as "early reflexed," which suggests *A. stolonifera* rather than *A. oblongifolia.* In consideration of the plausibility of the present interpretation the writer is disposed to interpret the Nantucket plant as a Mendelian phase of a hybrid between these two common coastal species.

From the standpoint of geographical distribution the genus *Amelanchier* is interesting. It has been plainly shown by various writers, and more recently by Fernald in this country, that the chemical nature of the soil, within certain limits, is of great importance as an influencing factor in distribution.[2] In addition to the evidence already published, two summers in Newfoundland and one in Maine have convinced the writer of the importance of this factor in distribution. It is with reference to the presence or absence of calcium in the soil that the greatest influence on vegetation is seen. Soil free from calcium apparently soon becomes acid, and the question then is one

[1] Bicknell, Bull. Torr. Bot. Club xxxviii. p. 453.

[2] Unger: (title translated) Influence of soil on the distribution of plants as shown in the vegetation of North-eastern Tyrol (1836).

Kerner & Oliver: Nat. Hist. Plants, ii. p. 495.

Fernald: Rhodora, ix. p. 149 (1907).

Hilgard: Soils.

Rubel: Pflanz. geog. Monog. d. Berninageb.— Engler's Jahrb., xlvii. p. 1–616 (1911–1912).

largely of alkaline or acid soils; but not entirely that, since recent research has shown that calcium has also a peculiar power of rendering harmless various toxic substances in the soil. Furthermore, by pot cultures, Coville[1] has recently shown that certain plants, as for instance the blueberry (*Vaccinium*), cannot be grown successfully in soil containing calcium even in small quantities when thoroughly mixed with the soil. In the light of these experiments and field observations it is interesting to find that several species of *Amelanchier* show a decided soil preference. *A. sanguinea* is confined to the limestone belt of northern and central Maine, and to the calcareous regions in Vermont, in central New York and in Canada. *A. humilis,* also, is a plant of the calcareous regions of Vermont, New York and Canada. Likewise, *A. canadensis* may be a calciphile, especially in its northeastern range. This species is abundant in the calcareous region of New York State, but enters New England only in the limey western edge. In the isolated station at Pembroke, Maine, it was growing in company with several other calciphile plants, probably because of a local outcrop of limestone. *A. oblongifolia* and *A. stolonifera,* on the other hand, are distinctly non-calciphilous plants. They inhabit the granitic and sandy regions of coastal and central New England, and the coastal plain from New England southward, but extend up the various rivers where the coastal plain flora follows the sands and gravels far into the more limey interior. *A. stolonifera* is also found on the non-calcareous sandstone summits of certain mountains in Vermont, in the sand of Warren and Saratoga counties, New York, and possibly in the sands of the Great Lakes. In central New York *A. oblongifolia,* if its existence there should be corroborated, finds its most inland known limit; here a shrub with some characteristics of *A. oblongifolia* grows either in peat bogs or in special non-calcareous swamps. The most typical development of this shrub in Central New York is in a marsh in which occur the only stations in the Cayuga Lake Basin for the coastal *Lyonia ligustrina* and *Prunus cuneata.* *A. laevis,* on the other hand, shows no evidence of soil preference. It grows equally well in central New York, throughout New England, and throughout the various calcareous and non-calcareous regions of Newfoundland. *A. Bartramiana* likewise does not show a special preference for either calcareous or non-calcareous districts.

[1] Experiments in Blueberry Culture — Bull. 193, Bureau of Plant Industry, U. S. Dept. Agric. (1910).

In closing this general discussion, the writer must call attention to the desirability of much further field work in connection with the genus *Amelanchier.* Our knowledge of the region around Lake Superior, Lake Michigan, and Lake Huron, and of the Dakotas, Iowa, Minnesota, and Lake Winnipeg is especially weak, and in regard to the Southern States, also, information is sadly lacking. The present treatment can be considered only tentative, therefore, so far as these regions are concerned.

In the future much better specimens of *Amelanchier* should be made. The herbaria are now clogged and overloaded with flowering specimens unaccompanied by fruit or leaves. For accurate work these are worthless, and the writer cannot guarantee to name specimens of that sort accurately. To prepare good specimens collections should be made from the same plant at flowering time just as the first petals begin to fall, at the time when the fruit is half grown, and at the maturity of the leaves. Mature ripe fruit is nearly useless. The mature leaves are not absolutely necessary, but the other two collections are indispensable. If time and opportunity will allow, still other stages in development should be obtained, and in this respect Mr. W. M. Blanchard cannot be too highly praised for setting an excellent example. Full notes should be taken in regard to the habitat, habit, time of flowering and fruiting, and these should be appended to the label.

The following is a synopsis of the more important characteristics of the various species. For the drawings of leaves and young and old fruits of the different species the writer is indebted to the skill and generosity of Mr. F. Schuyler Mathews.

A. Flowers racemose: leaves from acute to rounded or cordate at the base, conduplicate when young[1]; petioles slender, 8–25 mm. long: hypanthium and summit of the ovary various: base of the style abruptly inserted on the nearly flat summit of the ovary: fruit globular, ovoid, or ellipsoid.

B. Teeth of the leaves coarse (on average leaves 3–5 (6) per cm.): veins conspicuous, usually straight, parallel, and close together, short intermediate ones few or none (*Ulmus-* or *Alnus*-like): summit of the ovary woolly: hypanthium open, saucer-shaped, constricted

[1] In the buds of the first seven species the leaves are conduplicate, and on emerging from the bud remain for some time closely folded together. Instead of being equitant, however, they are placed side by side in the peculiar manner shown in Fig. 5–H. In the eighth species, *A. Bartramiana*, the leaves are not folded, but more or less imbricated in the bud, as in Fig. 8–H. The leaves of this species, on emerging from the bud, are nearly flat (see Gray's Man., ed. 7, p. 459). This is a strange difference to be found between species of the same genus, but a similar condition is found in plums and cherries.

below on the very young fruit[1]: sepals revolute from the middle at the time when the petals fall.

C. Margins of the leaf forming an angle at the apex: petals narrow or broad.

D. Petals 11–20 mm. long, narrow: sepals 4 mm. long: hypanthium very open and flat: racemes more or less drooping: leaves oval-orbicular; upper veins, in typical specimens, running straight to the apex of the coarse spreading sharp teeth (not so in the var.): scrawny, slender, often arching, shrubs, 1.0–2.5 m. high; stems solitary or few together. 1. *A. sanguinea.*

DD. Petals 7–10 mm. long, broad: sepals 2–3 (4) mm. long: hypanthium deeper: racemes erect or nearly so: leaves oval-oblong; veins usually becoming irregular just before reaching the margin; teeth less conspicuous, because of shorter acuminations, and more ascending, sometimes confined to the apex: more stiffly upright shrubs 0.3–1.2 m. high, growing in colonies (not clumps) from rhizome-like bases. 2. *A. humilis.*

CC. Margins of the leaf forming a rounded or sub-truncate, rarely retuse, apex; blade broadly oval or oblong-oval; veins irregular near the margin; teeth usually fewer. 3. *A. florida.*

BB. Teeth of the leaves fine (5–12 per cm. on average leaves); veins irregular, unequally distant, usually with frequent intermediate shorter ones (*Pyrus*-like); summit of the ovary, etc. various.

C. Leaves densely white-tomentose when young, becoming green; lower pedicels 7–18 mm. long, in fruit 10–25 mm. long.

D. Leaves rounded at the apex (rarely subacute): hypanthium large at flowering time, 3–5 mm. in diam.: sepals narrow, triangular or lanceolate, acute, erect or recurved from the middle at the time when the petals fall: petals short, 7–9 mm. long: shrubs.

E. Hypanthium saucer-shaped, constricted below on the very young fruit: sepals recurved from the middle when the petals fall: summit of the ovary woolly, at least when young: leaves oval; veins 7–11 (average 8–9) pairs; teeth on average leaves 20–28 (32) on each side: stems 0.3–1.2 m. high, forming colonies as in *A. humilis.* 4. *A. stolonifera.*

EE. Hypanthium campanulate, not constricted below on the young fruit: sepals mostly erect: summit of the ovary glabrous, rarely slightly woolly: leaves oblong; veins 10–15 (average 11–13) pairs; teeth finer, (20) 25–40 (45) on each side: stems 1.2–8 m. high, forming alder-like clumps. 5. *A. oblongifolia.*

DD. Leaves short-acuminate: hypanthium small, 2.5–3 (3.5) mm. diam., campanulate, not constricted below on the young fruit: sepals broad, oblong-triangular, obtuse or abruptly acute or abruptly short-acuminate, reflexed from the base when the petals fall: summit of the ovary glabrous: petals elongated, 10–14 mm. long; shrubs or trees. 6. *A. canadensis.*

CC. Leaves nearly or quite glabrous from the first, ovate, oval, or

[1] In some species of *Amelanchier* (*A. sanguinea, humilis, florida, stolonifera,* and *Bartramiana*), as the fruit matures, the hypanthium remains on the summit in almost its original saucer-shaped form during the period of growth just subsequent to the falling of the petals. Between the hypanthium and the ovary, in this case, there is therefore, a conspicuous constriction at this period. In other species (*A. canadensis* and *laevis*) the ovary seems to grow up into the hypanthium so that the latter is stretched around the summit of the young fruit. The constriction in these cases is, therefore, much less, or none at all. The condition in *A. oblongifolia* is somewhat intermediate. As the fruit grows older these distinctions become much less marked.

elliptical, and very acute or commonly short acuminate at maturity; brownish-purple, half-grown, and unfolded at flowering time: petals elongated (10–18 mm. long): summit of the ovary glabrous: hypanthium campanulate, slightly constricted on the very young fruit: sepals lanceolate, usually reflexed from the base when the petals fall: lower pedicels 15–33 mm. long, in fruit 30–50 mm. long: trees or tall shrubs. 7. *A. laevis.*

AA. Flowers commonly solitary (1–3 together), not racemose: mature leaves from barely acute at the base to cuneate or tapering; imbricated in the bud, not conduplicate, flat or nearly so when young; petioles short and stout, 2–7 (10) mm. long: hypanthium more or less constricted below on the young fruit: top of the ovary woolly: base of the style more gradually enlarged into the ovary and woolly: fruit ellipsoid-ovoid; shrubs. 8. *A. Bartramiana.*

1. A. sanguinea (Pursh) DC.

Mespilus canadensis γ *rotundifolia* Michx., Fl. Bor. Am. i. p. 291 (1803), not *A. rotundifolia* (Lam.) Dum. Cours. Bot. Cult. ed. 2, v. p. 459 (1811). *Pyrus sanguinea* Pursh, Fl. Am. Sept., p. 340 (1814). *Aronia sanguinea* Nutt., Gen. Amer. i. p. 306 (1818). *Amelanchier sanguinea* DC., Prod. ii. p. 633 (1825); Britton, N. A. Trees, p. 439 (1908). *A. canadensis* γ *rotundifolia* T. & G., Fl. N. A. i. p. 473 (1840), in part. *A. rotundifolia* Roemer, Fam. Nat. Syst. Rosif. p. 146 (1847); Brit. & Brown, Ill. Fl. ii. p. 238 (1897); Brit., Man. p. 518 (1901). *A. canadensis* var. *rotundifolia*, Gray, Man. ed. 1, p. 130 (1848); also eds. 2–6. *A. canadensis* var. *spicata* Sarg., Silva iv. p. 129 (1892), in part. *A. spicata* Robinson & Fernald, Gray's Man. ed. 7, p. 460 (1908).

Straggling or arching slender shrub 1.0–2.5 m. high, not stoloniferous and not forming colonies, the stems solitary, or few in a clump: leaves oval to oval-oblong, rarely orbicular (blade 3–6 cm. × 2.5–4 cm.), rounded or subcordate at the base, apex subacute, margin coarsely dentate-serrate nearly or quite to the base with broad sharp spreading teeth (4–5 (6) teeth per cm., about 20–23 teeth on each side if toothed to the base) separated by acute, open sinuses; green above when young, rarely purplish, unfolding before the flowers, at first densely pale-flavescent-tomentose below, retaining some tomentum especially on the petioles, but often on the blade, till the fruit is half grown or rarely until maturity, at length pale green, slightly glaucous, and usually glabrous or nearly so; veins in an average leaf 13–15 pairs, rather close together, straight, conspicuous, all of the upper in typical specimens running straight to the margin and ending in the teeth (*Ulmus*-like), the uppermost strongly ascending; mature petioles slender, 12–22 mm. long: flowers many in a loose flexuous or drooping raceme (4–7 cm. long), slightly silky; lower pedicels (10) 12–30 mm. long, in fruit 12–25 (30) mm. long; flowers large and showy: petals linear to narrowly spatulate, 11–15 mm. long, 3–4 mm. wide: hypanthium rather large, open-saucer-shaped, 5 mm. in diameter,

glabrous outside or with a zone of hair at the base, constricted below on the young fruit and then very prominent: sepals ovate-lanceolate or lanceolate, very acute, 4 mm. long, revolute from the middle when the petals fall, glabrous without, hairy within: summit of the ovary densely woolly: fruit rather large, almost black, glaucous, very sweet, juicy and agreeable. Figs. 1 A–G.

A very beautiful species when well developed; the flowers appearing 10–14 days later than those of *A. canadensis* and *A. laevis*; the fruit maturing in August or September. On dry rocky or gravelly soil in calcareous districts; eastern, northern and central Maine, Vermont, western Massachusetts, Quebec, Ontario, Michigan, and possibly farther westward, south through New York along the mountains to northern Alabama.

Forma **grandiflora**, f. nov., floribus pergrandibus pulchrisque, petalis 17–20 mm. longis, 5–6 mm. latis.

Flowers very large and showy; petals 17–20 mm. × 5–6 mm. Overhanging the ravines of central New York. Type in Gray Herb.: Ithaca, N. Y. *Wiegand.*

Var. **gaspensis**, var. nov., glabra foliis novellis gemmisque exceptis; venis foliorum ad marginem valde reticulatis.

Glabrous, except the youngest leaves and flower buds: the veins of the leaves prominently anastomosing before reaching the teeth. Rocky banks and river gravel on the Gaspé Peninsula, Quebec. Type in Gray Herb.: alluvial woods, mouth of Bonaventure River, 1902. *Fernald & Williams.*

Britton, in describing the habit of this species in the Illustrated Flora says; "A tall shrub or small tree, sometimes 25° high"; and in the N. A. Trees he says: "Its maximum height is 6 meters, with a trunk diameter of about 3 dm." Blanchard (Torreya, vii. p. 100) in writing of what was probably this species, says: "It has large and nearly round leaves, generally coarsely toothed,— and is often quite large or a small tree." Michaux gives the habit "*arborescens,*" which, from the context, means in size between a tree and a shrub. The writer is acquainted with this species in central New York, where it festoons the crests and the ledges of cliffs bordering lakes and ravines, and is usually flanked or backed by other bushes and trees. It always occurs, therefore, in slightly more humid situations than those frequented by *A. humilis.* There, in that locality, it is always a delicate, wand-like, arching shrub, never more than about 3 m. high and with a stem never over 3 cm. in diameter. Sometimes these stems are solitary, sometimes in groups of several, but never forming broad patches as in *A. humilis,* nor forming dense clumps as in *A. oblongifolia.* Nothing even remotely approaching a tree-like habit has ever been

reported in central New York. The writer has also been told by one who is familiar with this species in Maine, that the habit there is as described for central New York, and certainly not tree-like. Mr. Eggleston has informed the writer, personally, of a single tree-like individual of this species in Vermont. Such individual trees may be hybrids with one of the arborescent species.

The var. *gaspensis* is a perplexing form. It varies much in stature and in habitat, as well as in leaf-outline and dentation. The leaves suggest an intermediate condition between this species and *A. humilis*, especially in the venation. In its more glabrous nature it approaches *A. florida;* but the general appearance of the majority of the specimens, both when in flower and in fruit, suggests that it is better to retain this form in *A. sanguinea* until further field study renders it better understood. More field work on all the Amelanchiers of Gaspé is very desirable.

The following typical specimens have been examined. Maine: — Washington Co. rocks, Pembroke, July, 1909, *Fernald & Wiegand* (*Fernald* no. 1880): Aroostook Co. rocky river bank, Masardis, September, 1897, June, 1898, *Fernald*, no. 2311; Houlton, ledgy shore, August, 1897, *Fernald*; gravelly river bank, Ashland, June, 1898, *Fernald*, no. 2310 (not typical): Piscataquis Co. cliff below the falls, Dover, August, 1895, *Fernald*, no. 388; rocky shore, Dover, 1896, *Geo. B. Fernald*, nos. 40 and 40f; calcareous slate ledges along river, Foxcroft, May and July, 1896, *Geo. B. Fernald*, nos. 53 and 53f; ledgy shore, Sangerville, July, 1897, *Fernald*: Somerset Co. Moose Brook, valley of Sebasticook River, 1873–78, *F. S. Bunker:* Penobscot Co. Orono, May, 1873, *F. L. Scribner:* Oxford Co. ledgy river bank, Gilead, 1897, *Kate Furbish*. Vermont: — Essex Co. Canaan Falls, August, 1899, *W. W. Eggleston*, no. 1121: Addison Co. rocky bank along Otter Creek, Middlebury, May and July, 1901, *Brainerd:* Rutland Co. Bald Mt., Shrewsbury, May, 1900, *Eggleston*, no. 1970 (not typical): Windsor Co. rocky summit, Hawkes Mt., Cavendish, August, 1900, *Fernald*, no. 449. Massachusetts: — Franklin Co. calcareous slaty ledges by the Connecticut River near Miller's Falls, May, 1911, *Fernald:* Berkshire Co. summit of Tom Ball Mt., Alford, August, 1904, *R. Hoffmann*. New York: — Washington Co. rocks, Mt. Nebo west of Fort Ann, September, 1911, *S. H. Burnham*, no. 15: Tompkins Co. White Church, June, 1881, *W. R. Dudley*, no. 55; Ithaca, rocks, 1897, *K. M. Wiegand*. North Carolina: — Buncombe Co. Craggy Mt., April & June, 1899, *Biltmore Herb.*, nos. 5664c and d; Cedar Cliff Mt., 1904, *Biltmore Herb.* Alabama: — Blount Co. "shrub," Sand Mt., June, 1901, *Biltmore Herb.*, no. 6706a. Ontario: — Brockville Co. rocky bank of St. Lawrence River, Brockville, October, 1907, *Blanchard*, set 6 (probably): Frontenac

Co., Plevna, August, 1902, *J. Fowler*: Simcoe Co. Gravehurst, August, 1897, *Biltmore Herb.*, no. 5664. MICHIGAN: — Huron Co. in poor and sandy ground in open woods, Sand Point, July, 1908, *C. K. Dodge*, Nos. 74, 76; Stony Island, Saginaw Bay, "plentiful in poor and sandy ground," July, 1908, *C. K. Dodge*, no. 75: Allegan Co. beach sand near Saugatuck, August, 1896, *C. F. Wheeler*. MINNESOTA: — Hennepin Co. Falls of Minnehaha, July, 1886, *L. H. Bailey*.

Forma GRANDIFLORA. NEW YORK: — Chenango Co. Norwich, May, 1892, *H. L. Stewart:* Tompkins Co. Fall Creek Ravine, Ithaca, May, 1882, *W. R. Dudley*, 1896, *K. M. Wiegand;* McKenney's Glens, Ithaca, 1899, *Wiegand;* Southwest corner of Cayuga Lake, Ithaca, 1899, *Wiegand.*

Var. GASPENSIS. QUEBEC: — Gaspé Co. thicket near mouth of River St. Anne des Monts, August, 1905, *Collins & Fernald;* rocky bank, Percé Mt., Percé, August, 1904, *Collins, Fernald & Pease;* banks of Grand River, July, 1903, *Geo. H. Richards*, July, 1904, *Fernald:* Matane Co. banks of Matane River 10 miles up stream, August, 1904, *F. F. Forbes:* Rimouski Co. dry ledges, Bic, July, 1904, *Collins & Fernald:* Bonaventure Co. alluvial woods, mouth of Bonaventure River, July, 1902, *Williams & Fernald;* gravelly beach and flats, Bonaventure River, August, 1904, *Collins, Fernald & Pease.*

2. A. **humilis** sp. nov.

A. spicata many Amer. authors, in part, probably; not *A. spicata* (Lam.) Koch, Dendrol. i. p. 182 (1869).

Frutex 3–12 dm. altus caespitosus substoloniferus; foliis ovali-oblongis ovalibus vel obovato-cuneatis basi subcordatis vel rotundatis apice obtusis margine grosse dentato-serratis, dentibus valde patentibus, junioribus subtus dense tomentosis, pilis pallide flavescentibus, demum glabratis subviridis, venis subevanescentibus, petiolis 8–20 mm. longis; racemis densis erectis tomentosis; petalis 7–10 mm. longis obovato-oblongis; hypanthio pelviformi post anthesem infra constricto; sepalis brevibus triangulari-lanceolatis vel -ovatis ab medio revolutis; ovario ad apicem dense lanato; fructu atropurpureo glauco.

A rather stiffly upright shrub, 3–12 dm. high, growing in patches from rhizome-like bases (stoloniferous), the individual stems scattered: leaves oval-oblong or less commonly oval, rarely obovate-cuneate (blade of average leaves 2.5–5 cm. long by 2–4 cm. broad), sub-cordate, rarely rounded at the base, broadly rounded to a low angle at the apex, rarely sub-acute or sub-truncate; margin coarsely dentate-serrate to below the middle, or in stunted plants to the middle only; teeth rather low, often double, ascending, abruptly short-apiculate from a blunt summit, sinus acute (4–5 teeth per cm., about 20 teeth on each side when toothed to the base); green above when

young, unfolding with the flowers, at first densely pale-flavescent-tomentose beneath, at length pale green and glabrous or nearly so except usually the petioles, and slightly glaucous; veins in average leaves 9–13 pairs, conspicuous, ascending, the upper especially so, close together, slightly more arching and slightly less regular than in *A. sanguinea*, mostly forking and becoming indistinct before reaching the margin; mature petioles 8–20 mm. long: flowers small and numerous in rather dense terminal and lateral upright racemes (about 4–5 cm. long); pedicels and axis silky-tomentose, lower pedicels 8–17 mm. long, in fruit 10–20 (25) mm. long: petals obovate-oblong, broad for the length (7–10 mm. by 4–5 mm.), broadest just above the middle: hypanthium saucer-shaped, about 4 mm. in diameter, constricted below on the young fruit and then quite prominent, tomentose outside or becoming glabrate toward the summit: sepals short, triangular-lanceolate or ovate, 2–4 mm. long, revolute from the middle when the petals fall, usually hairy on both sides: ovary densely woolly at the summit: fruit almost black, glaucous, sweet, juicy and agreeable. Figs. 2 A–G.

Flowers appearing with those of *A. sanguinea*, about 10–14 days later than *A. canadensis;* fruit maturing in August. Dry open rocky or gravelly soil in calcareous districts; Vermont and Ontario to New York, Ohio, Nebraska, and Minnesota, and apparently northwestward to Mackenzie.

This species differs from *A. sanguinea* in its low stature, stoloniferous growth, blunter leaves, lower, blunter and more ascending teeth, less straight and less parallel veins which do not run directly to the teeth, upright dense woolly racemes, smaller flowers on shorter pedicels with shorter and broader sepals and petals, and slightly deeper, narrower hypanthium. The hypanthium of *A. sanguinea* is almost rotate, while that of *A. humilis* is deeply saucer-shaped.

A. humilis is always low, and, so far as the writer can learn, always has the peculiar "stoloniferous" habit above described. The roots or stems just at the surface of the ground or slightly below extend horizontally a short distance in a very irregular fashion and then send up strictly erect branched aerial shoots. The result is a "patch" of plants often covering a square meter or more with the aerial stems equally distributed over that area. The writer is acquainted with this species on the shores of Cayuga Lake in Central New York, where it forms patches on the crests of the driest calcareous cliffs along the lake, and where it is exposed to full sunlight. Writing of this species, presumably, Mr. Herbert Groh [1] says: "Each patch is some square

[1] Ont. Nat. Sci. Bull. (No. 6, p. 52, 1910.)

rods in extent, like a thicket of raspberries or osier-dogwood, and the closely crowded stems composing it are only from one to three feet in height, and when found were flowering profusely, regardless of size."

Occasionally, both in Vermont and at Ithaca, N. Y., individual plants occur with obovate-cuneate leaves dentate near the apex only, but in other respects typical. These seem like mere individual variations from the normal type.

The following typical specimens have been examined. VERMONT: — Lake Champlain, limestone headlands, Cloak Island, Isle la Motte, June, 1907, *J. A. Cushman*, no. 871 (probably); dry banks of Grand Isle, *Robbins*, *Oakes* (probably). NEW YORK: — Rensselaer Co. Lansingburg, *C. H. Peck;* Troy, *H. H. Eaton:* Orange Co. West Point, May, 1882, *Ella W. Mearns* (probably): Tompkins Co. exposed rocks, shore of Cayuga Lake, Ithaca, 1896, *Wiegand.* ONTARIO: — Near Mt. Dennis, June, 1900, *D. W. Beadle;* Hastings Co., Belleville, 1878, *Macoun;* vicinity of Ottawa, July 1906, *Rydberg*, no. 7912. OHIO: — Franklin Co. Columbus, *Sullivant* (?). MICHIGAN: — Kent Co. very barren sand, June, 1897, *C. W. Fallass.* WISCONSIN: — 1882, *J. Dunlop:* Dame Co. 1861, *T. J. Hale.* IOWA: — Floyd Co. Charles City, May, 1875, *J. C. Arthur:* Fayette Co., 1894, *B. Fink.* MINNESOTA: — Houston Co. Spring Grove, June, 1902, *C. O. Rosendahl*, no. 316. NEBRASKA: — Cherry Co. Valentine, May, 1898, *Bates;* Simeon, July, 1899, *Bates;* Merriman, 1898, *Bates:* Dawes Co. Fort Robinson, May, 1897, *Bates:* Greeley Co. Scotia Junction, *Bates:* Rock Co. Kirkwood, *Bates:* Brown Co. Johnstown, *Bates.* ALBERTA: — vicinity of Banff, June, 1906, *Stewardson Brown*, nos. 23 & 56 (not typical). ATHABASCA: — Athabasca River, 1892, *Miss E. Taylor* (probably this sp.). MACKENZIE: — Fort Resolution, 1903, *E. A. Preble*, no. 202 (probably this sp.).

3. A. FLORIDA Lindley.

Aronia alnifolia Nutt., Gen. Am. i. p. 306 (1818), possibly: *Amelanchier florida* Lindley, Bot. Reg. t. 1589 (1833): *Am. alnifolia*, many Am. authors.

Shrub 0.5–3 m. high: leaves broadly oval or short-oblong-oval (blade of average leaf 3–4 cm. × 2.5–3.3 cm.); base subtruncate, rarely rounded or subcordate; apex rounded, subtruncate, or rarely retuse; margin coarsely and sharply toothed, usually to the middle or rarely below, with few, spreading, deltoid, obliquely acute teeth (3–5 teeth per cm.), and acute open sinuses; green above when young, fully unfolded but not full grown at flowering time, tomentose at first but very soon entirely glabrous (usually before the flowers are fully expanded); veins about 12 pairs, rather conspicuous, parallel, close

together, the upper strongly ascending, all slightly irregular and not running straight to the margin; mature petioles 15–20 mm. long: racemes many flowered, mostly lateral, short, dense, erect, glabrous, 3–5 cm. long; lower pedicels 8–17 mm. long, in fruit 10–25 mm. long: flowers small or of medium size: petals from oblong to narrowly oblong, 7–15 mm. long: hypanthium open saucer-shaped, very rarely slightly woolly, 3–4 mm. in diameter, constricted below on the young fruit: sepals short, triangular or lanceolate, 1.5–2.5 mm. long, recurved from the middle when the petals fall, slightly woolly inside: summit of the ovary woolly, becoming almost glabrate in fruit: mature fruit almost black, glaucous. Figs. 3 A–G.

Related to *A. sanguinea* in its narrow and often long petals, but differing in the blunter leaves with veins which do not reach the margin, fewer teeth of a different shape, shorter erect racemes with the flowers on shorter pedicels, and the more glabrous character of the whole plant. Closely related to *A. humilis* in the venation of the leaves and in general appearance, but differing in narrower, often longer, petals, blunter leaves, usually sharper teeth, and much earlier loss of totentum.

The following typical specimens from the area covered by this paper have been examined. Michigan: — Houghton Co. Isle Royale, July, 1909, *W. S. Cooper*, no. 122: Keweenaw Co. on bluffs, May & July, 1889, *O. A. Farwell:* Alcona Co. Plains, June, 1888, *L. H. Bailey.*

4. A. **stolonifera** sp. nov.

A. spicata Brit. & Brown, Ill. Fl. ii. p. 238 (1897), in part; Brit. Man. p. 517 (1901) in part; many Europ. auth. in part: not *A. spicata* (Lam.) Koch, Dendrol. i. p. 182 (1869). *A. ovalis* of many Europ. auth. in part; not *Pyrus ovalis* Willd., Berlin Baumz., ed. 1, p. 259 (1796); not *A. ovalis* Medic. Gesch. p. 79 (1793): not *A. ovalis* Borkh., Fortb. ii. p. 1259 (1803). *A. oblongifolia* Robinson & Fernald, Gray's Man. ed. 7, p. 460 (1908), in part.

Frutex 3–12 dm. altus substoloniferus caespitosus; foliis ovalis raro oblongo-ovalibus orbicularibus vel obovato-cuneatis apice fere rotundatis mucronatis basi fere rotundatis raro subcordatis vel cuneatis margine subtiliter serratis, junioribus subtus albo-tomentosis demum undique glabris vel glabratis, venis primariis 7–11 jugis irregularibus arcuato-ascendentibus evanescentibus; racemis brevibus densis erectis sericeo-tomentosis; petalis 7–9 mm. longis; hypanthio pelviformo post anthesem infra constricto conspicuo; sepalis revolutis; ovario ad apicem tomentoso; fructu atropurpureo vel nigro glauco.

A rather stiff upright shrub, 3–12 dm. high, forming patches ("stoloniferous") as in *A. humilis:* leaves commonly oval, rarely oblong-

oval or orbicular, very rarely obovate-cuneate (average blades 2.5–5 cm. × 2–3.5 cm.); apex rounded or sub-acute, mucronate; base rounded, rarely subcordate with a small narrow sinus, rarely cuneate; margin finely serrate with low obliquely-mucronate teeth, almost or quite entire on the lower third (5–8 teeth per cm.; 20–28, rarely 30–32, teeth on each side if toothed to the base), and acute or rounded, open sinuses; green and glabrous above when young, densely white-tomentose beneath, soon glabrous throughout or the petioles and midribs often remaining slightly hairy; about half grown at flowering time and then just unfolding, at maturity usually pale green and glaucous, sometimes deep green; primary veins, in average leaves, 7–11 (mostly 8–9) pairs, irregularly and distantly arranged, usually curved upward beyond the middle and becoming very irregular and indistinct before reaching the margin; mature petioles slender, 10–18 mm. long: racemes short, dense, erect, 1.5–4 cm. long; pedicels and axis silky tomentose or almost glabrous, the lower pedicels 7–15 mm. long, in fruit 12–22 mm. long: flowers small: petals obovate-oblong, broad for the length, 7–9 mm. long: hypanthium open, saucer-shaped, about 3–4 mm. in diameter, tomentose at the base or nearly glabrous, constricted below on the young fruit and then very prominent: sepals triangular-lanceolate, 2.5–3 mm. long, revolute from the middle when the petals fall, inner face tomentose: summit of the ovary densely woolly: fruit purplish black, glaucous, sweet, juicy and of good flavor. Figs. 4 A–G.

Flowers appearing a few days later than those of *A. oblongifolia* and *A. laevis;* fruit maturing in July. On dry rocks, gravel, or rarely in sand, in non-calcareous districts on the coastal plain; in Newfoundland, and from Maine to Virginia. It accompanies the coastal plain flora up the rivers, and extends to the non-calcareous summits of mountains in Vermont and western Massachusetts, as well as to the sandy region about Albany, New York, and Lake George, and apparently also to the shores of Lake Huron and Lake Erie. Type specimen in Gray Herb.— Sandy R. R. bank, Wellesley, Mass., May–June, 1911, *Wiegand.*

This species has the same habit as *A. humilis,* and takes the place of that plant on the coastal plain. In floral structure there is very little difference between the two, but the foliage of the present species is much more closely related to that of *A. oblongifolia,* from which it differs in the shorter outline of the leaf, fewer veins, and slightly coarser teeth. It is similar to *A. sanguinea, A. humilis, A. florida,* and *A. Bartramiana* in the conspicuous constricted hypanthium on the half grown fruit. The remaining four species are without this character.

The following typical specimens have been examined. Newfoundland: — Grand Falls, rocks and talus, gorge of the Exploits

River, July & August, 1911, *Fernald & Wiegand*, nos. 5557, 5558, 5559, 5561, 5562, 5563, 5608, 5623, 5633; Rushy Pond, gravelly and rocky pond shore, July & August, 1911, *Fernald & Wiegand*, nos. 5627, 5630, 5635. Maine: — Washington Co. dry roadside thicket, West Pembroke, July, 1909, *Fernald & Wiegand* (*Fernald*, no. 1887): Hancock Co., Orland, *Helen G. Atkins:* Penobscot Co. river bank, Roebar's, July, 1900, *Fernald;* ledgy shore, Oldtown, September, 1897, *Fernald;* ledgy shore, Orono, July, 1892 and 1897, *Fernald:* Piscataquis Co., granite ledges, top of Bunker Mountain, East Guilford, May, 1896, *Geo. B. Fernald*, no. 39: Franklin Co. Phillips, September, 1894, *Furbish;* crevice of rocks, Bald Mt., July, 1902, *E. B. Chamberlain:* Kennebec Co. ledgy river bank, Waterville, June, 1874, *F. L. Scribner*, September, 1898, *Fernald;* Kent's Hill, Readfield, 1892, *Furbish:* Androscoggin Co. South Poland, 1893 and 1895, *Furbish;* East Livermore, 1894, *Furbish;* Livermore Falls, 1878, *Furbish;* Bear Mt., Livermore, 1896, *Furbish:* Oxford Co. low bushes on ledgy bank, Gilead, August, 1897, *Furbish:* Lincoln Co. roadside, Bristol, July, 1903, *J. R. Churchill:* Sagadahoc Co. West Bath, 1892, *Furbish:* Cumberland Co. West Baldwin, 1900, *Furbish;* Brunswick, 1892, *Furbish:* York Co. Wells, 1898, *Furbish;* rocky woods, York, June, 1900, *Fernald;* Shapleigh, June, 1901, *Furbish*. New Hampshire: — N. H., *H. E. Sargent*, no. 25: Cheshire Co. ledgy river bank, Walpole, July, 1899, *Fernald*. Vermont: — Chittenden Co. Essex Junction, August, 1899, *Eggleston*, no. 1176: Addison Co. cliffs, Snake Mt., Weybridge, May, 1899, *E. Brainerd:* Rutland Co. Twin Mt., May, 1898, *Eggleston*, no. 185 (probably this sp.). Massachusetts: — Essex Co. East Gloucester, May, 1899, *J. H. Sears:* Middlesex Co., Middlesex Fells, May, 1881, *F. S. Collins;* Stoneham, South Reservoir, July, 1894, *W. P. Rich;* Natick, dry upland woods, Pickerel Pond, 1909, *Wiegand:* Norfolk Co. summit of Great Blue Hill, ledges, May, 1899, *Kennedy & Fernald*, ledges, north side, June, 1900, *W. P. Rich*, 1900, *E. F. Williams*, 1901 and 1902, *F. G. Floyd;* Wellesley, dry banks, 1908, *Wiegand*, and sandy railroad bank, 1911, *Wiegand:* Nantucket Co. June, 1900, *M. A. Day*, no. 75: Franklin Co. sand plains, Miller's Falls, Montague, May, 1911, *Fernald:* Berkshire Co. the Dome near summit, Sheffield, August, 1902, *R. Hoffmann*. Connecticut: — New London Co. moist ground near Stillman's Cove, Waterford, May and June, 1901, *C. B. Graves:* Hartford Co. dry sandy bank, East Hartford, May & September, 1906, *C. A. Weatherby*, no. 2018; Southington, rocky or sandy roadside, 1900, 1901, *C. H. Bissell*. New York: — Washington Co. sandy plains north of Sandy Hill, August, 1900, *S. H. Burnham;* rocks east of Fort Ann, May, 1900, *Burnham:* Warren Co. rocks in Hudson River, Glens Falls, May & September, 1900, *Burnham*, no. 13: Suffolk Co. dry pine barrens south of Ronkonkoma, July, 1908, *R. M. Harper:* New York Co., Cactus Knoll, New York City, June, 1899, *W. N. Clute*. New Jersey: — N. J., 1840, *Asa Gray:* Sussex Co.

Culvers Gap, summit of west side, July, 1907, *S. S. Van Pelt;* High Point, 1891, *N. L. Britton;* high rocky hill, High Point, July, 1909, *K. K. Mackenzie,* no. 4201: Passaic Co. rocky headlands, Charlotteburg, May, 1908, *K. K. Mackenzie:* Bergen Co. Palisades, 1890, *Bicknell:* Union Co. (?), Great Island near Elizabethport, July, 1890 (not typical): Monmouth Co. margin of woods, July, 1910, *S. Brown & B. Long,* no. 168. Pennsylvania: — Luzerne Co. L. V. R. R. between Moosehead and Bear Creek Junct., July, 1901, *S. Brown:* Monroe Co. base of Pocono Knob, July, 1896, *J. Crawford;* near Tannersville, July, 1901, *S. Brown:* Northampton Co. on the Delaware River above Easton, May, 1897, *T. C. Porter:* Bucks Co. Naseville, May 1897, *A. Jahn:* Chester Co. Phoenixville, July, 1863, *I. C. Martindale.* Maryland: — Montgomery Co. rocks, Great Falls of the Potomac, 1895, *F. V. Coville,* no. 166, *Pollard,* no. 166; May, 1899 *E. S. Steele.* Virginia: — Princess Co. near Virginia Beach, 1898, *Coville & Kearney,* no. 51 (not typical): Nansemond Co. near Suffolk, 1898, *Kearney* (not typical). North Carolina: — Buncombe Co. banks of French Broad River, June, 1898, *Biltmore Herbarium,* no. 6706 (not typical). Michigan: — Alpena Co. on sterile "plains" near Alpena, July, 1895, *C. F. Wheeler.*

5. A. oblongifolia (T. & G.) Roemer.

Mespilus canadensis a obovalis Michx., Fl. Bor. Am. p. 291 (1803) (?); Sarg., Silva, iv. p. 128 (1892), in part. *M. arborea* Michx., Hist. Arb. Am. Sept. iii. p. 68 (1810), in small part. *Pyrus ovalis* Bigel., Fl. Bost. ed. 2, p. 195 (1824); Pursh, Fl. Am. Sept. p. 340 (1814): not *P. ovalis* Willd., Berl. Baumz. p. 259 (1796); nor *A. ovalis* Medic. Gesch. p. 79 (1793): nor *A. ovalis* Borkh, Forstb. ii. p. 1259 (1803). *Aronia ovalis* Torr., Fl. N. U. S. p. 479 (1824). *Am. canadensis β oblongifolia* T. & G., Fl. N. A. i. p. 473 (1840); Torr., Fl. N. Y. p. 225 (1843); Gray, Man. ed. 1, p. 130 (1848); ed. 2, in part; ed. 6, in part. *A. oblongifolia* Roem., Fam. Nat. Syst. Rosifl. p. 147 (1847); Robinson & Fernald, Gray's Man. ed. 7, p. 460 (1908), in part; *A. Botryapium* Brit. & Brown, Ill. Flora ii. p. 238 (1897), in part; Brit., Man. p. 517 (1901), in part. *A. obovalis* Ashe, Bot. Gaz. xxxv. p. 434 (1903); Sarg., Trees N. A. p. 361 (1905), in part. *A. intermedia* Blanchard, Torreya, vii. p. 98 (1907), in part; Brit., N. A. Trees, p. 438 (1908), in part; not *A. intermedia* Spach, Hist. Veg. Phan., ii. p. 85 (1834).

Shrub with the slender upright stems growing in rather dense fastigiate clumps (cespitose, alder-like), 2–8 m. high, not stoloniferous: leaves oblong elliptic-oblong or narrowly obovate-oblong (average blades 3–5.5 cm. × 1.8–2.8 cm.); apex rounded or barely acute, mucronate or cuspidate; base rounded, rarely subcordate with a minute sinus, rarely subacute; margin very finely serrate with low sharp teeth nearly or quite to the base (6–11, av. 8–9, teeth per cm.,

or fewer on leaders; 20–45, mostly 25–40, teeth on each side on average leaves) and acute but open sinuses; when young densely white tomentose beneath, nearly glabrous above, less than half grown at flowering time and still unfolded, at maturity usually deep green, rarely glaucous, glabrous except petiole and lower portion of midrib, the latter prominent; primary veins in average leaves 10–15 (mostly 11–13) pairs, somewhat irregular, rather close together, slightly upcurved toward the margin, becoming indistinct and anastomosing in the outer third, uppermost veins widely spreading; mature petioles 8–15 mm. long: racemes short, dense, upright, terminal and many lateral, 2.5–6 cm. long; pedicels and axis silky-tomentose, lower pedicels 8–18 mm. long, scarcely longer in fruit (10–22 mm. long): flowers rather small: petals from obovate-oblong to oblanceolate or linear, 7–9 (10) mm. long, usually narrower than in *A. stolonifera:* hypanthium campanulate, 3–5 mm. in diameter, tomentose at the base or all over, on young fruit still campanulate and not conspicuously constricted: sepals tomentose within, triangular, acute, 1.5–2.5 (3) mm. long, erect or irregularly spreading: summit of the ovary glabrous or very rarely somewhat woolly: fruit nearly black, glaucous, moderately sweet and agreeable. Figs. 5 A–H.

Flowers appearing early with those of *A. laevis;* fruit ripe in June. Non-calcareous swamps or low grounds in the coastal plain from southern Maine to South Carolina and possibly Georgia.[1]

This is a very characteristic plant along the coast. In Massachusetts and Connecticut, where it is quite common, the bushy habit enables one to recognize it at a distance when it is in flower, since the peculiar alder-like habit is quite characteristic. The calyx and hypanthium of this species represent a distinct type, since it is the only species, except possibly *A. Bartramiana,* in which the sepals do not normally turn back in some fashion. About Boston, where the writer has observed this plant for several seasons, the short *stubby* sepals are quite generally erect, or only irregularly spreading, even until the fruit is mature. This species, too, is the only one in which the lanation of the summit of the ovary varies greatly, and all gradations from a completely glabrous condition, which seems most common, to a sparsely lanate covering may occasionally be found. All other characters, however, remain fairly constant. At present, there is no good reason to believe that this variation in the woolly covering of the ovary is due to hybridization.

[1] Ashe says of his *A. obovalis*, which seems to be this species: — "This plant is not uncommon along the edges of swamps on loose soils from Smithfield, N. C., southward along the coast to Augusta, Ga., and according to Sargent to Mobile, Ala." The writer has not seen plants from so far south.

As the fruit matures the inflorescence expands much less in this species than in others, the axis and pedicels remaining short. The shoots upon which the racemes are borne remain short also, while frequently there is a strong growth of leafy shoot beyond the inflorescence and as a result the inflorescence often appears to have been left far behind, and to have been lateral when really terminal after the manner of *Stellaria uliginosa.* Unfortunately this condition is too frequently obscure to be of use as a distinguishing characteristic.

At Ithaca, New York, and at Freeville, ten miles away, a very anomalous condition exists in respect to *A. oblongifolia.* Several plants have been found by the writer in low or boggy ground, which have the exact habit of this species and which appear like it when in flower, but which have a more acute leaf than *A. oblongifolia* with fewer veins and fewer sharper teeth as well as a slight tendency toward purple coloration when young. The largest and finest of these plants are found in a boggy spot noted already as an extreme inland station for several coastal plain species, among which is *Lyonia ligustrina.* A satisfactory disposition of these plants cannot be made until the region is thoroughly searched to see if the typical *A. oblongifolia* may not be discovered. If such a discovery should be made these anomalous plants may be reasonably interpreted as hybrids between *A. oblongifolia* and *A. laevis.*

The following typical specimens have been examined. Maine:— Kennebec Co. Fayette, 1878, *K. Furbish:* Oxford Co. Gilead, 1897, *Furbish:* Cumberland Co. West Baldwin, September, 1900, *Furbish:* York Co. Wells, 1897, 1898, *Furbish.* Massachusetts: — Essex Co., Ipswich, *Oakes;* East Gloucester, July, 1891, *J. H. Sears:* Middlesex Co. Lincoln, May, 1906, *Fernald;* Spot Pond, Stoneham, May, 1854, *Wm. Boott;* Fresh Pond swamps, Cambridge, 1855, *Wm. Boott:* Suffolk Co. Roxbury, 1835, *Wm. Boott:* Suffolk or Norfolk Cos. Stony Brook Reservation, June, 1895, *P. Gallagher,* June, 1895, *W. W. Manning:* Norfolk Co. swamps, Wellesley, 1908, *K. M. Wiegand;* Blue Hill, wet place near observatory, 1911, *Wiegand;* Holbrook, June, 1899, *E. F. Williams:* Barnstable Co. Hyannisport, July, 1896, *J. R. Churchill.* Connecticut: — New London Co. moist ground near Silliman's Cove, and low ground near south end of Fargo Road, Waterford, May & July, 1901, *C. B. Graves:* Hartford Co. "roadside in sandy soil," and "beside brook," and "roadside in wet hard soil," Southington, May & June, 1901, *C. H. Bissell:* New Haven Co. damp woods, Oxford, May & June, 1901, *E. B. Harger:* Fairfield Co. wet woods, Bridgeport, May, 1901, *E. H. Eames.* New York: — Richmond Co. in swamp, Annadale, May & August,

1892, *N. L. Britton:* Tompkins Co. (probably this sp.). New Jersey: — Passaic Co. Manchester, 1877, *A. Brown:* Monmouth Co., Farmingdale, May 1910, *B. Long & S. Brown*, no. 3600: Ocean Co. Forked River, 1896, Exc. Torr. Bot. Club: Burlington Co. Brown's Mills, April, 1905, *A. MacElwee:* Camden Co. (?) Westville, May, 1894, *A. MacElwee:* Atlantic Co. Landisville, June, 1899, *C. A. Gross* Herb.; Folsom, June, 1911, *B. Long*, no. 5918; Newtonville, June, 1911, *B. Long*, no. 5915. Pennsylvania: — Delaware Co. Preston Run, June, 1904, *A. Jahn:* Lancaster Co. 1900, *Heller;* vicinity of Smithville, May, 1890, *J. K. Small.* District of Columbia: — Vicinity of Washington, 1880, *L. F. Ward.* Virginia: — Norfolk Co. Great Bridge, May, 1893, *Britton & Small;* near Northwest, 1898, *Kearney*, no. 1100: Princess Ann Co. 1898, *Kearney*, no. 1125. North Carolina: — South East N. C., *W. W. Ashe:* Cumberland Co. Fayetteville, 1895, *A. Bradford.* South Carolina: — Darlington Co. "ditch across creek at Paper Mill," Hartsville, 1909, *W. S. Coker* (probably this sp.).

6. A. canadensis (L.) Medicus.

Mespilus canadensis L. Sp. Pl. p. 478 (1753). *Pyrus Botryapium* L. f. Suppl. p. 255 (1781); Willd. Sp. Pl. ii. p. 1013 (1799); Pursh Fl. Am. Sept. p. 339 (1814). *Crataegus racemosa* Lamk. Encyc. i. p. 84 (1783) (?). *Mespilus nivea* Marsh. Arbust. p. 90 (1785) (?). *A. canadensis* Medic. Gesch. p. 79 (1793). *Crataegus amoena* Salisb. Prod. p. 357 (1796). *Mespilus canadensis β cordata* Michx. Fl. Bor. Am. p. 291 (1803). *A. Botryapium* Borkh. Handb. Forstb. ii. p. 1260 (1803) (?); DC. Prod. ii. p. 632 (1825); Hook, Fl. Bor. Am. i. p. 202 (1840) (?); Brit. & Brown, Ill. Fl. ii, p. 238 (1897), in part; Brit. Man. p 517 (1901), in part; Small Fl. Se. U. S. p. 531 (1903), in part. *Aronia Botryapium* Pers. Syn. ii. p. 39 (1807); Torr. Fl. N. & M. U. S. I. p. 479 (1824). *Mespilus arborea* Michx. Hist. Arb. Am. Sept. iii. p. 68 (1810). *Aronia arborea* Barton, Comp. Fl. Phil. i. p. 228 (1818). *Am. ovalis β subcordata* DC. Prod. ii. p. 632 (1825) (probably this sp.). *Aronia subcordata* Raf. ex. DC. Prod. ii. p. 632 (1825) (?). *Am. canadensis α Botryapium* T. & G. Fl. N. A. p. 473 (1840); Torr. Fl. N. Y. p. 225 (1843); Gray, Man. ed. 1, p. 130 (1848) (?); Robinson & Fernald in Gray's Man. ed. 7, p. 460 (1908). *A. canadensis* var. (?) *oblongifolia*, Gray's Man. ed. 2, p. 126 (1856), in part; Man. ed. 6, p. 167 (1889), in part. *A. canadensis* var. *obovalis* Sarg. Silva iv. p. 128 (1892) in part. *A. canadensis* var. *tomentula* Sarg. Trees N. A. p. 361 (1905); Robinson & Fernald, Rhodora xi. p. 47 (1909). *A. intermedia* Brit. N. A. Trees, p. 438 (1908) in part; not Spach, Hist. Veg. Phan. ii. p. 85 (1834).

Irregularly bushy tree, 5–10 m. high, or sometimes a shrub, fastigiately and irregularly branched above; stems solitary or few

together: leaves generally obovate, less commonly ovate, oval or oblong (average blades 4–10 cm. long by 2.2–5 cm. wide); base cordate, or very rarely rounded or subacute on individual leaves near the ends of shoots; apex very acute, or more commonly acuminate; margin very sharply and somewhat doubly serrate almost or quite to the base, with medium ovate-triangular acuminate teeth separated by usually acute rather deep sinuses (6–10 teeth per cm.; (38) 45–75, mostly 50–60 teeth, on each side of average leaves); blades and petioles densely white tomentose below when young, less so above, traces of tomentum usually persistent, especially on the petioles, until maturity or even until old age, becoming green, not purple, very small at flowering time and not unfolded, or even entirely enclosed within the bud-scales; at maturity green or yellowish green, scarcely glaucous; primary veins in average leaves 11–17 pairs, often with short intermediate ones, unequally distant, sinuous, anastomosing and indistinct in the outer third, the uppermost very irregular, widely spreading; mature petioles 10–25 mm. long: racemes short, rather dense, nodding, 3–5 cm. long; lower pedicels 8–17 mm. long, becoming 15–25 mm. long in fruit, silky tomentose: flowers of medium size: petals linear or linear-oblong, 10–14 mm. long: hypanthium small, 2.5–3 (rarely 3.5) mm. in diameter, campanulate, glabrous or somewhat woolly, soon stretched around the summit of the ovary after flowering, and not constricted below: sepals broadly oblong-triangular, abruptly pointed or obtuse, rarely more slender, tomentose, 2–3 mm. long, abruptly reflexed at the base when the petals fall: summit of ovary glabrous: fruit scanty, maroon-purple, dry and tasteless. FIGS. 6 A–G.

Flowers appearing very early in spring before the leaves, or with the leaves in the more shrubby forms; fruit ripening in June. Dry banks and hillsides, Washington County, Maine, and from western New Hampshire to Iowa, Kansas and Missouri, and southward to Georgia and Louisiana.

The broad sepals and small hypanthium are usually quite characteristic of this species, but both vary to some extent. It is also the only species with leaves distinctly tomentose on both surfaces when young. It is distinguished from *A. laevis* by the tomentose inflorescence and leaves, the size of the hypanthium, shape of the sepals, number of veins in the leaves, and the number and shape of the teeth. From *A. oblongifolia* it differs in habit, in length of petals, size of hypanthium, shape and position of the sepals as well as the shape of the leaf, and its apex. The teeth are sharper and larger than in *A. oblongifolia,* with deep sharp sinuses. In the Southwest, the sinuses, however, are frequently shallower and not so acute, and the hypanthium is often larger. The tomentum is more persistent than in any of the other species.

This is the most abundant species in central New York and probably the most abundant from Ontario southward and southwestward; but is unknown in eastern New England except at Pembroke, Maine. This isolated station at Pembroke is, however, not unique, since several other plants were found in the same locality which showed a similarly interrupted distribution. These other plants were calciphiles, which fact suggests that the occurrence of *A. canadensis* at Pembroke is due to a local outcrop of lime. Michaux,[1] in his description of *Mespilus arborea* (which is probably a synonym of *A. canadensis*), may have confused this species with others when he said: "With the exception of the maritime parts of the Carolinas and of Georgia, this tree is spread over the whole extent of the United States and of Canada; but it is most multiplied upon the Alleghany Mountains, and upon the elevated banks of the rivers which flow from them."

This species comes into full bloom before the leaves are conspicuous in the spring, and while they are still completely covered with white wool. The flowers are usually very abundant and the plant, therefore, presents a beautiful snowy-white appearance with no intermixture of green or purple. As the common conspicuous snowy-white shad-bush of the landscape, it replaces inland the *A. oblongifolia* of the coastal plain.

According to the experience of the writer in central New York, *A. canadensis* does not produce fruit which will at all compare in edible qualities with that produced by other species, and he has never seen it of the same blue-black color as in other species. The pulp, too, is usually comparatively dry and tasteless. Michaux says (of *Mespilus arborea*), " . . . largest tree rarely yields more than half a pound . . . The fruit of this tree is, in my opinion, too small and too scanty to reward the pains of improving its taste and of increasing its volume by long continued cultivation." On the contrary, Curtiss[2] says: "In the latter [Lower District] section of the State [North Carolina], it is hardly more than a shrub, and is common along branches and swamps (A. oblongifolia . . . ? . . . auct.). In the former [Upper D.], it inhabits the shaded sides of Mountains, and is 15 to 25 feet high. The fruit is here much sweeter, more juicy and palatable, like the *Medlar*, than in other parts of the State, and the trees are some-

[1] N. A. Sylva (Transl.) ii. p. 41 (1853).
[2] M. A. Curtis, Trees of N. C. p 68 (1860).

times recklessly cut down to obtain it." Whether this difference of opinion is due to a confusion of *A. canadensis, A. laevis,* and *A. oblongifolia* is an interesting question. Wangenheim[1] in writing of *Pyrus Botryapium* in "New York Province," says of the fruit (translated): "The dark-carmine-red round-oval fruit is ripe toward the end of June — the flesh that surrounds these [seeds] is whitish, of sour taste, and serves only for the food of birds." His *P. Botryapium* was described as hairy when young, and was probably, in the main, *A. canadensis.*

The relation of the arborescent and shrubby forms of this species is perplexing. In Central New York the writer has found the arborescent form more common in the open, and the small shrubby form more common in the woods or on cliffs. The more tree-like plants frequently have a very short trunk, or if the trunk is longer, it is irregular and the branches are frequently turned more to one side, so that the transition to the smaller plants is not as abrupt as would at first appear. The two, obviously intergrade. The shrubby individuals, which may have several stems from the base, suggest *A. oblongifolia,* but the tops are bushy and spreading, thus giving a more umbrella-type of growth than the fastigiate habit of *A. oblongifolia.* The leaves on the shrubby form are usually more or less unfolded at the time of flowering, while on most of the trees they have scarcely emerged from the bud-scales when the tree is in full bloom. These forms are probably ecological.

The following typical specimens have been examined. MAINE: — Washington Co. rocky woods, West Pembroke, July, 1909, *Fernald & Wiegand* (*Fernald,* no. 1885). NEW HAMPSHIRE: — Sullivan Co. Sumner's Falls, Plainfield, July, 1900, *Eggleston,* no. 1959. VERMONT: — Rutland Co. Noyes Swamp, Pittsford, May, 1899, *Eggleston,* no. 1183; Twin Mountain, West Rutland, July, 1900, *Eggleston.* MASSACHUSETTS: — Franklin Co. sandy thicket near Miller's Falls, May, 1911, *Fernald.* CONNECTICUT: — New Haven Co. Middlebury, April & July, 1896, *W. M. Shepardson.* ONTARIO: — Shore of Lake Ontario, Canada, 1891, *J. Dearners:* Welland Co. Niagara, May, 1901, *J. Macoun,* no. 34296. NEW YORK: — Tompkins Co. dry banks, Ithaca, 1873 & 1882 *Dudley,* 1896 *Wiegand.* PENNSYLVANIA: — Lehigh Co. June, 1878, *A. F. K. Krout;* 1911 *H. W. Pretz,* nos. 3188, 3251, 3403: Monroe Co. August, 1911, *Bayard Long,* no. 6586: Philadelphia Co., June, 1908, *S. S. VanPelt:* Pike Co., Blooming Grove, May, 1891, *Anna M. Vail:* Alleghany Co. Harrison Township, 1893, *A. Koenig.* WEST VIRGINIA: — Upshur Co. Bucklin, 1895,

[1] Beitrag z. teutsch. Forstwiss.; Anpf. Nordam. Holza. p. 90 (1787).

W. M. Pollock. District of Columbia: — Anatoslian Island, April, 1881, *L. M. Ward.* Virginia: — Norfolk Co., near Norfolk, 1898, *Kearney*, no. 1173: Pulaski Co. on Peak Mountain, alt. 2200 ft., July, 1892, *J. K. Small:* Smyth Co. Pond Mountain, and Marion, May, July, 1892, *N. L. Britton, E. G. Britton & A. M. Vail:* Wash. Co. White Top Mt., Aug. 1892, *Small.* North Carolina: — Henderson Co. woodland near Flatrock, June, 1904, *Biltmore Herbarium*, no. 5615 f. South Carolina: — Oconee Co. Clemsen College, 1906, *H. D. House*, no. 1861. Georgia: — North Georgia, 1875, *C. Wright:* Bibb Co. dry woods near Holton, 19—, *R. M. Harper*, no. 1806 (not typical). Kentucky: — banks of the Licking River, *C. W. Short.* Ohio: — Lawrence Co. Ironton, April & May, 1892, *W. C. Werner.* Michigan: — Gratiot Co. Alma, sandy swamp, July, 1893, *C. A. Davis:* Ingham Co. campus, Michigan Agriculture College, Lansing, 1899. Illinois: — Lasalle Co. sandstone ledges, Starved Rock, July, 1909, *Greenman, Lansing & Dixon:* Peoria Co. hilly woodlands, Peoria, April–June, 1904, *F. E. McDonald.* Iowa: — Story Co. Ames, April, 1897, *R. Combs*, no. 350. Missouri: — rocky banks, Dumas, July, 1909, *B. F. Bush*, no. 5917: Newton Co. rocky banks, July, 1893, *Bush*, no. 85: McDonald Co. rocky banks, July, 1893, *Bush*, nos. 85a. & 85c., July, 1892, no. 30. Arkansas: — Benton Co. 1889, *E. N. Plank:* Yell Co. Petit Jean, April, 1903, *H. A. Pilsbry.*

7. A. **laevis**, sp. nov.

Pyrus Botryapium Bigel. Fl. Bost. ed. 2, p. 196 (1824); not *A. Botryapium* Borkh. Handb. Forstb. ii. p. 1260 (1803). *A. canadensis* var. *Botryapium* Gray, Man. ed. 1, p. 130 (1848) probably; also ed. 2. *A. canadensis* Gray, Man. ed. 6, p. 166 (1889), Sarg. Silva iv. p. 127 (1892); Brit. & Brown Ill. Fl. ii. p. 237 (1897); Brit. Man. p. 517 (1901); Small, Fl. Se. U. S. p. 531 (1903); Sarg. Trees N. A. p. 360 (1905); Robinson & Fernald in Gray's Man. ed. 7, p. 459 (1908); Brit. N. A. Trees p. 437 (1908).

Arbor humilis irregularis ad 13 m. (43 ped.) alta vel interdum frutex; foliis firmis ovato-ovalibus ovalibus vel ovato-oblongis semper glabris basi subcordatis rotundatis vel raro acutis apice breviter acuminatis margine argute serratis, junioribus luride glauco-purpureis raro viridibus demum viridibus, venis primariis 12–17-jugis irregularibus paulo arcuatis ad marginem reticulatis summis divergentibus, petiolis tenuibus 12–25 mm. longis; racemis plerumque flexuosis pendulis glabris; pedicellis perlongis; floribus grandibus pulchrisque; petalis 12–18 mm. longis; hypanthio campanulato post anthesem infra paulo constricto inconspicuo; sepalis revolutis; ovario ad apicem glabris; fructo purpureo vel atropurpureo glauco.

A tree, when well developed, 13 m. high or less, shrubby in the north: leaves firm in texture, ovate-oval, oval or ovate-oblong, rarely slightly

obovate or elliptical (blade 4–6 cm. long by 2.5–4 cm. wide), subcordate, rounded, or more rarely acute at base; apex short acuminate; margin sharply serrate nearly to the base (except in occasional specimens in which some or all of the lower teeth are omitted), with firm, callous-tipped, usually subulate, medium-sized teeth, and usually rounded sinuses, the body of the teeth usually wanting, or more rarely with acute sinuses and more prominent cuspidate teeth (6–8 teeth per cm.; 35–46 teeth on each side); glabrous from the first or with a few silky hairs, at flowering time one-half to three-fourths grown and lurid-glaucous-purple, rarely bright green, at maturity dark green and slightly glaucous, even the petioles glabrous; primary veins 12–17 pairs, with short intermediate ones, unequally distant, sinuous, slightly upcurving, anastomosing near the margin, uppermost widely spreading; mature petioles slender, 12–25 mm. long: racemes, when well developed, many-flowered, flexuous, drooping, glabrous or nearly so, 3–7 cm. long; pedicels very long, the lower 15–33 mm. long, becoming in fruit (25) 30–50 mm. long: flowers large and showy: petals oblong-linear, 10–18 mm. long: hypanthium campanulate, 2.75–5 mm. broad, glabrous, soon stretched around the summit of the ovary after flowering, very slightly or not at all constricted below: sepals triangular-lanceolate or subulate (2.75) 3–4 mm. long, mostly abruptly reflexed at the base when the petals fall: summit of the ovary glabrous: fruit purple or nearly black, glaucous, of fair quality, when half grown often broader than long. Figs. 7 A–G.

Flowers appearing with the leaves in early spring; fruit ripe in June in the latitude of Massachusetts and New York. On damp wooded slopes and banks, or in fields where not too dry, or at the edge of swamps, in calcareous and non-calcareous soil, from Newfoundland throughout New England, westward to Michigan and Kansas; and southward along the mountains to Georgia and Alabama. Type in Gray Herb. "near Aqueduct Bridge, Wellesley, Massachusetts, May & June 1911" *Wiegand.*

Forma **nitida**, f. nov., foliis perviridibus nitidis.— Leaves deep green, not glaucous, lustrous. In Newfoundland, and probably elsewhere. Type in Gray Herb. Bishop's Falls, Newfoundland, July, 1911, *Fernald & Wiegand*, no. 5593.

A more northern species than *A. canadensis*, very common in Newfoundland, and fairly common throughout New England. At Ithaca, N. Y., it grows in the ravines bordering Cayuga Lake, in damp situations, and usually on the south sun-screened side; while *A. canadensis* is found on the dry rocky crests and fields nearby. In central New York it also occurs around swamps. Though a tree in New York and southern New England, it becomes more like a fastigiate shrub in its northern range, especially in Newfoundland. There, also, the leaves are frequently narrower, and a larger proportion of

them have tapering bases. All intermediate gradations occur, however. The fruit in New England and New York is rarely abundant, according to the writer's experience, but in the North the bushes are often heavily laden.

A. laevis differs from *A. canadensis* in the size and coloring of the leaves at flowering time, texture and shape of the leaves at maturity, number of teeth, shape of the teeth, length of the pedicels, size of the hypanthium, and length and shape of the sepals. When growing together, the contrast in appearance at flowering time is striking. The loose racemes and bronzy foliage of *A. laevis* give a rich somewhat drooping effect; while in *A. canadensis* the whole tree is pure white and usually stiffer.

The following typical specimens have been examined. Newfoundland: — St. Johns, 1911, *Fernald & Wiegand*, nos. 5538, 5568: Whitbourne, 1911, *Fernald & Wiegand*, nos. 5552, 5587, 5591, 5632: Grand Falls, 1911, *Fernald & Wiegand*, nos. 5547, 5578a. Quebec: — Quebec Co. vicinity of Montmorenci Falls, June, 1905, *J. Macoun*, no. 66926. New Brunswick: — Kent Co. May, 1870, *J. Fowler*. Nova Scotia: — Guysborough Co. Boylston, May–September, 1890, *C. A. Hamilton:* Pictou Co. fence-row near Pictou, July, 1901, *Howe & Lang*, no. 549: Digby Co. edge of pond near Digby, July, 1901, *Howe & Lang*, nos. 265 & 297. Maine: — Washington Co. rocky woods, Pembroke, July, 1909, *Fernald & Wiegand* (*Fernald*, no. 1884): Hancock Co. Bar Harbor, *F. H. Peabody:* Penobscot Co. Bangor, 1875, *F. L. Scribner;* Orono, 1873, *Scribner*, 1892, *F. G. Gould*, 1888, 1889, 1904, *Fernald;* Stillwater, 1896, *E. D. Merrill:* Somerset Co. Cambridge, 1873–8, *F. S. Bunker;* East Mercer, *Abbie E. Packard:* Knox Co. Camden, top of Mt. Battie (1325 ft.), July, 1903, *K. Furbish:* Kennebec Co. Kent's Hill, Readfield, September, 1892, *K. Furbish;* Fayette, 1878, 1894, *K. Furbish;* Manchester, May, 1874, *F. L. Scribner:* Franklin Co. Rangeley, 1894, *K. Furbish:* Oxford Co. Gilead, 1897, *K. Furbish:* Androscoggin Co. Bear Mountain, Livermore, 1896, *Furbish;* South Poland, 1895, *Furbish:* Cumberland Co. West Baldwin, September, 1900, *Furbish;* Brunswick, May, 1892, *Furbish:* York Co. Old Orchard, July, 1901, *Furbish;* North Berwick, 1893–95, *J. C. Parlin*, May, 1897, *Fernald;* Kennebunkport, July, 1907, *H. J. Koehler*. New Hampshire: — Coos Co. roadside, Whitefield, 1896, *W. Deane:* Grafton Co. Franconia, May, 1892, *E. & C. E. Faxon;* near Flume House, Franconia, 1855, *Wm. Boott:* Carroll Co. Wolfboro, May, 1909, *H. E. Sargent*, no. 22: Cheshire Co. Mt. Monadnock, May, 1895, *J. R. Churchill*, May, 1897, *Rand & Robinson*, no. 617, alt. 2000 ft., May, 1898, *E. F. Williams*. Vermont: — Orleans Co. roadside, Westmore, June, 1909, *J. R. Churchill:* Lamoiole Co. Johnson, May, 1894, *A. J. Grout:* Rutland Co. Rut-

land, June, 1899, *Eggleston*, no. 1117 & 1185: Windham Co. rocky hill, Westminister, May–June, 1906, *Blanchard*, set 1; Basin Farm Bridge, North Westminister, May–June, 1907, *Blanchard*, set 2: Bennington Co. Pownal, June, 1901, *F. G. Floyd*. MASSACHUSETTS: — Essex Co. Ipswich, *Oakes:* Suffolk Co. Revere, 1877, *H. A. Young:* Middlesex Co. Mystic Pond, 1855, *Wm. Boott:* Norfolk Co. Wellesley, 1907–11, *Wiegand:* Worcester Co. Ashburnham, May, 1896, *Sydney Harris*, May, 1898, *J. R. Churchill:* Franklin Co. sandy thicket near Miller's Falls, May, 1911, *Fernald:* Berkshire Co., Williamstown, summit of Mt. Greylock, June, 1898, *J. R. Churchill;* Savoy, May, 1901, *R. Hoffmann*. RHODE ISLAND: — Providence Co. East Providence, 1902, *J. F. Collins*. CONNECTICUT: — New London Co. rocky bank of river, Groton, May–June, 1901, *C. B. Graves:* Litchfield Co. Winchester, June, 1901, *E. B. Harger:* Hartford Co. roadside, Southington, May–June, 1901, *C. H. Bissell:* New Haven Co. damp woodland, Oxford, May–June, 1901, *Harger*. ONTARIO: — Welland Co. Queenstown Heights, May, 1901, *J. Macoun*, no. 34304. NEW YORK: — Warren Co. May, 1902, *S. H. Burnham:* Tompkins Co. damp woodlands and clearings, Ithaca, 1896–1906, *Wiegand:* Richmond Co. Tocht Hill, Staten Island, April, 1891, *N. L. Britton*. NEW JERSEY: — Sussex Co. High Point, May, 1891, *H. Kraemer*. PENNSYLVANIA: — Sullivan Co. Ganoga Lake, April, 1897, *S. Brown:* Luzerne Co. Lake Lugh, May, 1903, *S. Brown:* Monroe Co. Pocono Plateau, August, 1904, *J. W. Harshberger:* Lehigh Co. Bake-oven Knob, May, 1911, *H. W. Pretz*, no. 3246: Delaware Co. Brandewine, May, 1901, *B. H. Smith:* Lancaster Co. near Safe Harbor, April, 1891, *Heller & Halbach:* Franklin Co. Blue Ridge Summit, May, 1906, *S. Brown & S. S. Van Pelt*. VIRGINIA: — Washington & Grayson Cos. Summit of White Top Mountain, alt. 5678 ft., May, 1892, *J. K. Small*, May–June *E. G. Britton & A. M. Vail:* Augusta Co. Mt. Rogers (Elliott's Knob), alt. 2000–4473 ft., May, 1893, *Heller*, no. 824: Smyth Co. Dickies Creek, June, 1892, *N. L. & E. G. Britton & A. M. Vail:* . . . . Co. Mountain Lake, June, 1890, *N. L. & E. G. Britton*. NORTH CAROLINA: — Buncombe Co. Gray Beard Mt., 1901, *Pollard;* summit of Little Craggy Mt., May, 1898, *Biltmore Herbarium*, no. 5615a: Watauga Co. between Shull's Mills and Grandfather Mt., 1891, alt. 4000 ft., *Small & Heller*, no. 239 (not quite typical): Roan Mt., Eagle Cliff, alt. 5500 ft., 1902, *W. A. Cannon*, no. 136: Spring Mt. Park (Western N. C.), 1897, *E. C. Townsend*. KENTUCKY: — *C. W. Short* (in part): Lyon Co. Bluff Spring to Mout, June, 1909, *Eggleston*, no. 4701. TENNESSEE: — steep rocky cliff, Knoxville, May, 1896, *A. Ruth*, no. 13 (not typical). GEORGIA: — Rabun Co. Rabun Bald, June, 1906, *H. D. House*, no. 2283: Lookout Mt. (woods), July, 1898, *A. Ruth*, nos. 284, 292 (in part): Habersham Co. Tallulah Falls, alt. 1600 ft., August, 1895, *J. K. Small*. ALABAMA: — Mobile Co. streams, *C. Mohr*. MICHIGAN: — Keweenaw Co. 1889, *O. A. Farwell*, nos. 48 & 49: Huron Co. dry sandy ground in open woods, Sand Point,

July, 1908, *C. K. Dodge*, no. 72: St. Clair Co. Port Huron, woods and river bank, May, 1838, *D. Houghton:* Ingham Co. near Lansing, May & August, 1887, *L. H. Bailey:* Wayne Co. vicinity of Linden Park, Detroit, 1893, *Farwell*, no. 53: *Gratiot* Co. river banks, Alma, July, 1893, *C. A. Davis.* Indiana: — Porter Co. Dune Park, 1903, *Agnes Chase*, no. 2053. Illinois: — Cook Co., Evanston, *P. Price.* Wisconsin: — Racine or Kenosha Cos. May, 1900, *S. C. Wadmond:* Jefferson Co. woods, Jefferson Junct., July, 1903, *H. Eggert.* Missouri: — Iron Co. Pilot Knob, July, 1888, *L. H. Pammel.* Kansas: — Cherokee Co. rocky woods, 1897, *A. S. Hitchcock.*

Forma nitida.

Newfoundland: — St. John's, August, 1911, *Fernald & Wiegand*, no. 5567: Glenwood, July, 1911, *Fernald & Wiegand*, nos. 5528, 5638: Bishop's Falls, July, 1911, *Fernald & Wiegand*, nos. 5592, 5593: Grand Falls, August, 1911, *Fernald & Wiegand*, nos. 5548, 5601: Rushy Pond, August, 1911, *Fernald & Wiegand*, no. 5542.

8. A. Bartramiana (Tausch) Roemer.

Mespilus canadensis δ oligocarpa Michx. Fl. Bor. Am. p. 291 (1803). *Pyrus Bartramiana* Tausch, Flora xxi. 2, p. 715 (1838). *A. canadensis ξ oligocarpa* T. & G. Fl. N. A. i. p. 474 (1840); Gray, Man. ed. 1–5. *A. oligocarpa* Roem. Fam. Nat. Syn. Rosif. p. 145 (1847); Gray, Man. ed. 6, p. 167 (1889); Brit. & Brown Ill. Fl. ii. p. 239 (1897); Brit. Man. p. 518 (1901); Robinson & Fernald in Gray's Man. ed. 7, p. 460 (1908). *A. Bartramiana* Roem. Syn. Rosif. p. 145 (1847). *A. arguta* Nutt. in Brit. Man. ed. 3, p. 1076 (1907).

Shrub, 0.5–2.5 m. high; stems several together, loosely cespitose-fastigiate (alder-like): leaves thin or firm, elliptical, varying to elliptic-oval or elliptic-oblong (average blade 3–5 (7) cm. long, by 15–30 (40) mm. wide); apex from rounded to very acute; base more or less acuminate; margin sharply, often doubly, serrate to below the middle or nearly to the base; teeth very variable, fine, usually abruptly and obliquely acuminate from a broad base, rarely muticous, the point strongly ascending, sinus usually sharp, sometimes rounded (6–12 teeth per cm.; 17–52 teeth on each side, or 4–15 on each side of leaves at ends of shoots); not conduplicate when young but flat or revolute, glabrous from the first except the slightly silky petioles, half-grown at flowering time, at maturity slightly glaucous; mid-rib unusually broad and conspicuous on the upper side; veins indistinct, very irregular, the primary pairs 12–17, irregularly distant, with shorter ones between, often crowded, sinuous, gradually and irregularly curved upward, anastomosing and indistinct in the outer third, the uppermost widely spreading; petioles stout and very short, 2–7 (10) mm. long: flowers 1–2, rarely 3, on each branchlet, one terminal, with others in the axils of the upper foliage leaves: pedicels glabrous, 10–25

(30) mm. long, in fruit scarcely longer (15–30 mm.): flowers small: petals broad and short, oblong-oval or oval, broadest at the middle, 6–9 mm. long: hypanthium 3–6 mm. wide, campanulate below, more spreading above, constricted below on the young fruit and then prominent: sepals 3–4 mm. long, triangular subulate, more or less persistently tomentose within even in fruit, loosely spreading, varying from nearly erect to somewhat revolute: ovary densely woolly at the summit, tapering into the somewhat thickened woolly style-base: fruit large for the genus, 13 mm. in diameter or less, ovoid, dark purple, edible. Flowers appearing rather late; fruit maturing in late July or in August, but not of the best quality. Figs. 8 A–H.

Damp uplands and borders of bogs, Labrador to mountains of Massachusetts, Adirondack and Catskill Mountains of New York, Pocono Plateau of Pennsylvania, and westward through Canada to northern Michigan and Minnesota.

Easily distinguished from all eastern species by the almost solitary and apparently axillary flowers, and the nearly sessile leaves, which are not conduplicate, but flat or near so when young, as well as by the more tapering summit of the ovary. The teeth of the leaves, also, have a peculiar look which is soon learned by experience.

The following typical specimens have been examined. Labrador: — Makkovik, August, 1896, *A. Stecker*, no. 19: Groswater Bay, Hamilton Inlet, inland along the Nascaupee and Crooked Rivers to Lake Michikaman, July, August, 1905, *Dillon Wallace:* Square Island Harbor, July, 1864, *B. P. Mann:* Red Bay, July, 1891, *Bowdoin College Exped.*, July, 1892, *J. D. Sornborger*, no. 20. Newfoundland: — St. John's, August, 1911, *Fernald & Wiegand*, nos. 5755, 5757: Whitbourne, August, 1911, *Fernald & Wiegand*, no. 5578: Glenwood, July, 1911, *Fernald & Wiegand*, nos. 5740, 5741: Notre Dame Bay, Dildo Run, July, 1911, *Fernald & Wiegand*, no. 5756: Snooks Arm, August, 1911, *Fernald & Wiegand*, no. 5535: Tilt Cove, August, 1911, *Fernald & Wiegand*, nos. 5745, 5746: Grand Falls, July, 1911, *Fernald & Wiegand*, nos. 5737, 5750, 5754, 5602: Rushy Pond, July, 1911, *Fernald & Wiegand*, no. 5744: Hodge's Hill, July, 1911, *Fernald & Wiegand*, no. 5751: Millertown Junction, July, 1911, *Fernald & Wiegand*, nos. 5738, 5739: Quarry, July, 1911, *Fernald & Wiegand*, no. 5736: Gaff Topsail, July, 1911, *Fernald & Wiegand*, no. 5752: Birchy Cove, Bay of Islands, July, 1910, *Fernald & Wiegand*, no. 3554. Ungava: — Lake Mistassini, swampy woods, August, 1885, *J. M. Macoun*. Quebec: — Saguenay Co. Eskimo Point near Mingan, June, 1909, *C. W. Townsend*; Mingan, June, 1909, *Townsend;* Seven Islands, August, 1907, *C. B. Robinson*, no. 782: Gaspé Co., Mount Albert, thicket below tableland, alt. 1000 m., August, 1905, *Collins & Fernald*, and northern slopes, July, 1906, *Fernald & Collins*, nos. 233 & 625; Table-top Mountain, alt. 670 m., western base, August, 1906,

Fernald & Collins, no. 614; low woods, banks of Grand River, June–July, 1904, *Fernald:* Rimouski Co. damp woods, Bic, July, 1904, *Collins & Fernald*; limestone and limestone-conglomerate ridges, Bic, July, 1907, *Fernald & Collins*, no. 1100: Quebec Co. vicinity of Montmorenci Falls, June, 1905, *John Macoun*, no. 66925. New Brunswick: — Serpentine River, July, 1900, *G. U. Hay*, no. 63: Bass River, July, 1875, *J. Fowler*. Maine: — Aroostook Co. damp woods, Fort Kent, June, 1898, *Fernald*, no. 2314; summit of Mars Hill, July 1893, *Fernald;* low woods near New Limerick, June, 1899, *Fernald & Chamberlain;* Houlton, 1881, *K. Furbish:* Washington Co. border of heath, Lubec, July & August, 1909, *Fernald & Wiegand*, (*Fernald* nos. 1882 & 1883); low woods, Cutler, July, 1902, *Kennedy, Williams, Collins & Fernald:* Piscataquis Co., Mt. Katahdin, August, 1847 *G. Thurber*, 18 (?) *Edward Everett Hale*, South Basin, September, 1898, *E. D. Merrill*, Chimney Pond and North Basin, July, 1900 *Fernald;* low woods, Greenville, July, 1895, *Fernald* no. 257; Brownville, May, 1905, *J. C. Parlin;* granite ledges, top of Buker Mt., East Guilford, May, 1896, *Geo. B. Fernald:* Penobscot Co. wet woods, Patten, August, 1897, *Fernald;* slopes of Mt. Chase, August, 1897, *Fernald:* Somerset Co. north slope of Mt. Bigelow, above 2000 ft., August, 1896, *Fernald;* mountain top, Caratunk, July, 1892, *Fernald:* Franklin Co. Mountain Pond Mt., Greenvale, August, 1894, *K. Furbish:* Oxford Co. low rocky woods around Swan Pond, July, 1901, *J. C. Parlin*, no. 1429; Streaked Mt., Hebron, May, 1897, *J. A. Allen:* Androscoggin Co. South Poland, 1893, 1895, *Furbish;* East Livermore, 1894, *Furbish:* Cumberland Co. rich woods by stream, Scarboro, May, 1903, *Fellows & Fernald:* York Co. Kennebunkport, June, 1907, *H. J. Koehler*. New Hampshire: — Coos Co. Mt. Washington, Lake of the Clouds, July, 1855, *Wm. Boott*, June, 1878, *E. & C. E. Faxon*, July, 1887, *W. C. Cusick;* Tuckerman's Ravine, July, 1888, *E. & C. E. Faxon*, June & August, 1901, *Eggleston*, no. 2369; Huntington's Ravine, September, 1890, *E. & C. E. Faxon;* Cape Horn, elev. 4600 ft., June, 1898, *E. F. Williams*, June, 1898, *J. M. Greenman*, no. 1058; near Crawford House, June, 1881, *E. & C. E. Faxon:* Grafton Co. Echo Lake, Franconia, May, 1892, *E. & C. E. Faxon;* Mt. Moosilauke, July, 1886, *E. & C. E. Faxon:* Cheshire Co. Mt. Monadnock, May, 1895, *J. R. Churchill*, alt. 3000 ft., May, 1897, *Rand & Robinson*, no. 616. Vermont: — Mt. Mansfield, June, 1893, *Eggleston*, July, 1897, *J. R. Churchill, E. F. Williams:* Rutland Co. Blueberry Hill Bog, Rutland, July, 1900, *Eggleston*, nos. 1960, 1963, 1964; Cedar Swamp, Fairhaven, May, 1893, May, 1898, *Eggleston*, June, 1899, *Eggleston*, no. 1119: Windham Co. Grout Pond, Stratton, alt. 2300 ft., August, 1900, *Eggleston*, no. 1962; dry land, roadside, Stratton, alt. 1500 ft., May, 1904, June, 1907, *Blanchard* set 1; in swamp, Stratton, July, 1904, *Blanchard*, set 2. Massachusetts: — Worcester Co., Mt. Wachusett, *Nuttall:* Berkshire Co., summit of Mt. Greylock, June, 1898 &

1901, *J. R. Churchill;* Florida, top of Hoosac Plateau, July, 1909, *R. Hoffmann.* NEW YORK: — Adirondack Mts., 1898, *W. H. Lewis, Jr.;* Panther Mt., near Little Moose Lake, July, 1906, *Rydberg*, no. 7808, also *S. S. Van Pelt & J. Crawford;* Rifle Notch, northern N. Y., September, 1900, *N. L. & E. G. Britton:* Ulster Co. Slide Mt., May, 1901, *N. L. Britton.* PENNSYLVANIA: — Monroe Co. Naomi Pines, Pocano Mt., July, 1893, *T. C. Porter;* Tobyhanna, July, 1893, *S. Brown*, 1894, *J. Crawford:* Sullivan Co. Ganoga Lake, 1897, *S. Brown:* Dauphin Co. East Mt., Williamstown, May, 1892, *F. E. Lloyd.* MICHIGAN: — Houghton Co., Isle Royale, July, 1909, *W. S. Cooper:* Keweenaw Co. Clifton, June, 1889, *O. A. Farwell*, no. 52d. MINNESOTA:— St. Louis Co. Vermillion Lake, July, 1886, *Arthur, Bailey, & Holway*, no. B407; Tower, June, 1893, *E. P. Sheldon.*

WELLESLEY COLLEGE.

EXPLANATION OF PLATES 95 AND 96.[1]

Figs. A, AA, B, and C. Representative leaves taken from various specimens. D. Calyx, hypanthium, and ovary at the time when the petals fall. E. Same, in vertical section. F. Same as D, but the fruit half mature. G. Same as F, but in vertical section. H. Cross-section of winter bud showing arrangement of leaves (the bud-scales were removed before sectioning).

SEVENTEENTH ANNUAL WINTER MEETING OF THE VERMONT BOTANICAL CLUB.

NELLIE F. FLYNN.

THE seventeenth annual winter meeting of the Vermont Botanical Club which was planned to be held in St. Johnsbury the last week in January but was postponed on account of the small-pox scare there was finally held at Dartmouth College, Hanover, New Hampshire, March 29 and 30, in conjunction with the Vermont Bird Club. Some thirty members of both Clubs were in attendance and the meeting was both enjoyable and instructive.

A lengthy program of about forty papers, two thirds of which were botanical, was successfully carried out, and about fifteen new members were elected. A most interesting lecture by Prof. Merritt L. Fernald of the Gray Herbarium on "Some Red Letter Days on the Newfoundland Barrens," illustrated with lantern slides and mounted specimens

[1] Since the plates were printed it has been noticed that the teeth of the leaves of *A. sanguinea* and of the middle leaf of *A. humilis* have been inadvertently somewhat exaggerated in the direction of fineness.

of the plants collected there, was given in Wilder Hall on the evening of the 29th. The assembling of the local floras of Vermont was a distinctive feature of the meeting. This, led by Mr. J. G. Underwood, is preparatory work on the new Flora of Vermont which will be issued in the not far distant future.

Bulletin No. 7 of the Club will be issued some time in June.

The summer meeting of the Club will probably be held in Franklin and Berkshire at several ponds and bogs in that vicinity, the last week in July, with a lengthening of the trip to Lakes Memphremagog and Willoughby for those so inclined.

The officers of the Club are: *President,* Dr. Ezra Brainerd, Middlebury; *Vice-President,* Mr. W. W. Eggleston, United States Department of Agriculture, Washington, D. C.; *Secretary,* Prof. George P. Burns, University of Vermont, Burlington; *Treasurer,* Mrs. Nellie F. Flynn, Burlington; *Editor,* Mr. George L. Kirk, Rutland; *Librarian,* Miss Phoebe M. Towle, Burlington.

Burlington, Vermont.

Vermont Botanical Club, Summer Meeting.— The annual joint summer meeting of the Vermont Botanical and Bird Clubs will be held on Thursday and Friday, July 25 and 26, at Franklin, Vermont, in the Northwest corner of the State. The shores of a large pond, and the flora of three cedars bogs unknown in great measure to the botanists of the state, form the greatest attractions. It has been felt that the Botanical Club should explore some of the more unknown parts of the State before the publication of the revised Flora of Vermont. After the meeting there will be opportunity for any who wish, to join in a trip to Lake Memphramagog at Newport, and the wild lands about Island Pond in the Northeast part of the State. Persons interested in this meeting should communicate with one of the members of the joint Committee.

Jay G. Underwood, Hartland, Vt.
Prof. George H. Perkins, Burlington, Vt.
Miss Delia I. Griffin, St. Johnsbury, Vt.

Josselyn Botanical Society.— The eighteenth annual meeting of the Josselyn Botanical Society of Maine will be at Gardiner, August 7, 1912, for three days' work in the field. Hotel rates will not

exceed two dollars per day, and we hope to secure reduced fare on the Maine Central Railroad from all points.

The summer meetings of this Society, since its organization, with three exceptions, have been held in June or early in July, and these three were on or near the seashore, so that this is the first opportunity offered for the collection and comparison of plants of the interior of the State in the month of August. This will afford a series of flowering plants differing much from those of June or July. Make your plans now to attend, and further notice, with additional information, will be sent two weeks previous to the meeting.— DANA W. FELLOWS, *Secretary*, 655 Congress St., Portland, Maine.

AN ILLUSTRATED KEY TO THE TREES.— It is always a pleasure to be able to recommend a book which is perfectly simple and direct and for which one does not have to offer an apology. Such a thoroughly satisfactory little work is the *Key of Trees* by Collins & Preston.[1] It is simply an illustrated key, without pretense to being anything more and without the mawkish padding which fills so many "tree books." But it is done with infinite care and will be found trustworthy and of real use by all who wish to know the identities and ranges of the native and ordinarily planted trees. A liberal interpretation of the definition of trees has been allowed so that all species which anywhere attain an arboreal habit are included, even many species of *Salix* and *Crataegus*. The illustrations, from photographs of trunks and line-drawings of leaves, are very accurate and aid to make the book the most satisfactory Key to Trees which has yet been produced.— M. L. F.

INTRODUCED PLANTS NEW TO CONNECTICUT.— In RHODORA, vol. xiii. 149, the writer enumerated a number of rare introduced plants found in a yard about a rubber reclaiming plant at Naugatuck, Connecticut. A number of other rare plants have been collected at this place since, four of them new to the State: *Hordeum murinum* L., a European species; *Tradescantia reflexa* Raf., a Spiderwort of the South and West; *Onosmodium occidentale* Mackenzie, a coarse plant of the western plains; and *Salvia verticillata* L., a European *Salvia*

[1] Illustrated Key to the Wild and commonly Cultivated Trees of the Northeastern United States and Adjacent Canada based primarily upon Leaf Characters, by J. Franklin Collins and Howard W. Preston. Pocket size, 184 + x pp. with 279 illustrations. N. Y. Henry Holt & Co. 1912.

with very handsome bluish blossoms; also the rare White Mustard, *Brassica alba* (L.) Boiss., growing in abundance.

Two other rare plants new to the State were collected the past season; *Achillea Ptarmica* L., Sneezeweed, about an old cellar at the foot of the "Glen," "High Rock Grove" Beacon Falls; and *Arctium nemorosum* Lejeune, growing with *A. Lappa* L. and *A. minus* (Hill) Bernh. on waste ground at Waterbury and appearing intermediate between them.— Arthur E. Blewitt, *Waterbury, Connecticut.*

A NEW VARIETY OF RUDBECKIA SUBTOMENTOSA.

Earl E. Sherff.

In the summer of 1910, while collecting in the immediate neighborhood of St. Louis, Missouri, the writer chanced to find a peculiar form of *Rudbeckia.* In general aspect, anise-scented involucre, etc., it closely resembled *R. subtomentosa* Pursh, a species very abundant in that vicinity; but in its light, greenish-yellow chaff-scales and yellowish disk-corollas, it was entirely distinct. Furthermore, extended observation showed that its flowers opened about two weeks later than did those of the species proper.

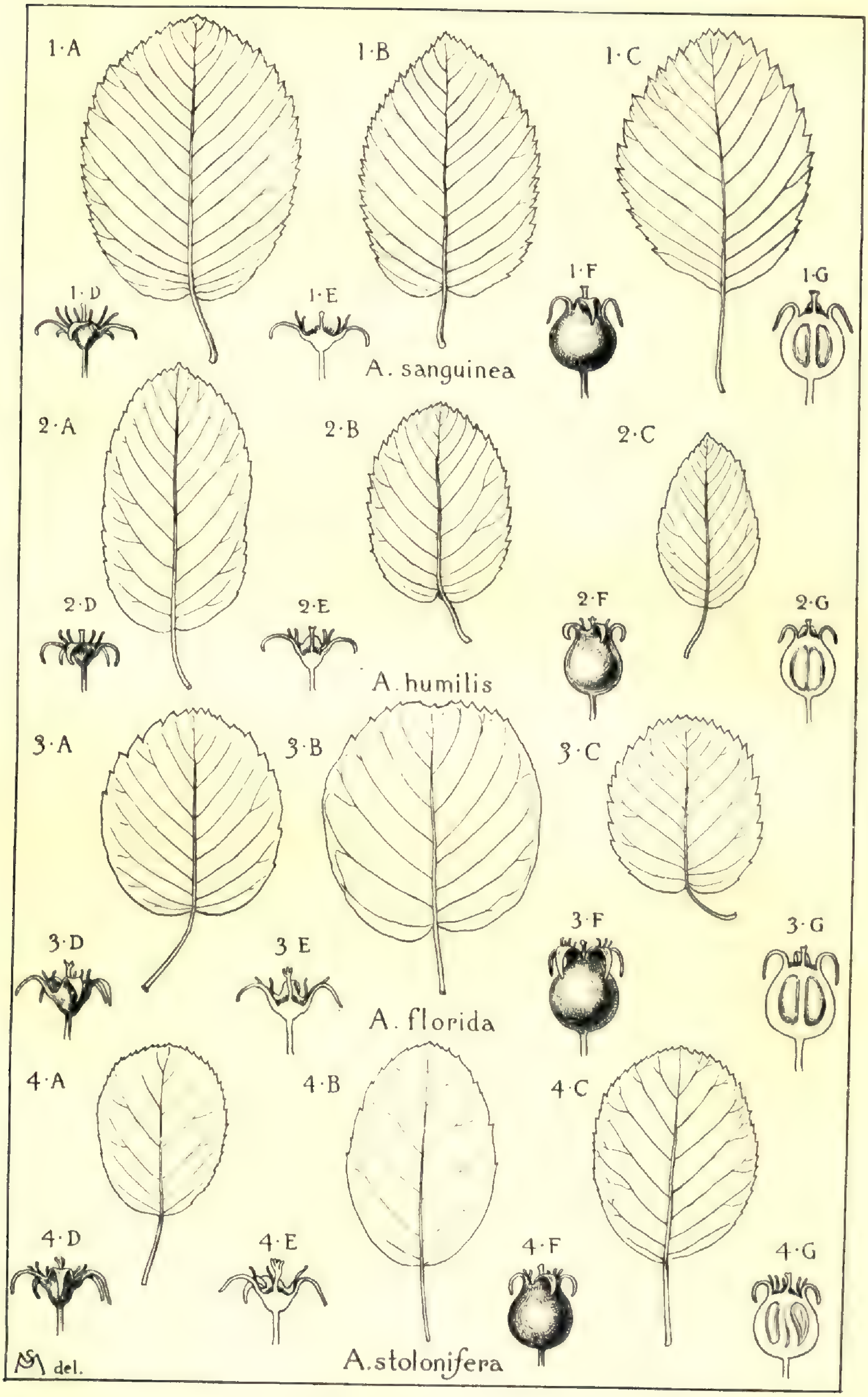
A careful search in literature and herbaria has failed to reveal previous mention of this plant. But in the summer of 1911, the same form was found growing south of Allenton, Missouri, by Dr. G. W. Letterman. And during the same year, further material was collected in the original locality by Professor Moses Craig,[1] of the Missouri Botanical Gardens. The evident constancy manifested by the form in its distinctive characters appears to warrant its treatment as a formal variety.

Rudbeckia subtomentosa, var. **Craigii**, n. var., paleis subviridiflavis, corollis subflavis. Type, fields and clearings, west of St. Louis, Missouri, August 19, 1910, *Sherff* no. 1,106; Gray Herbarium. Cotypes, Herb. Field Museum and Herb. Mo. Bot. Gardens.

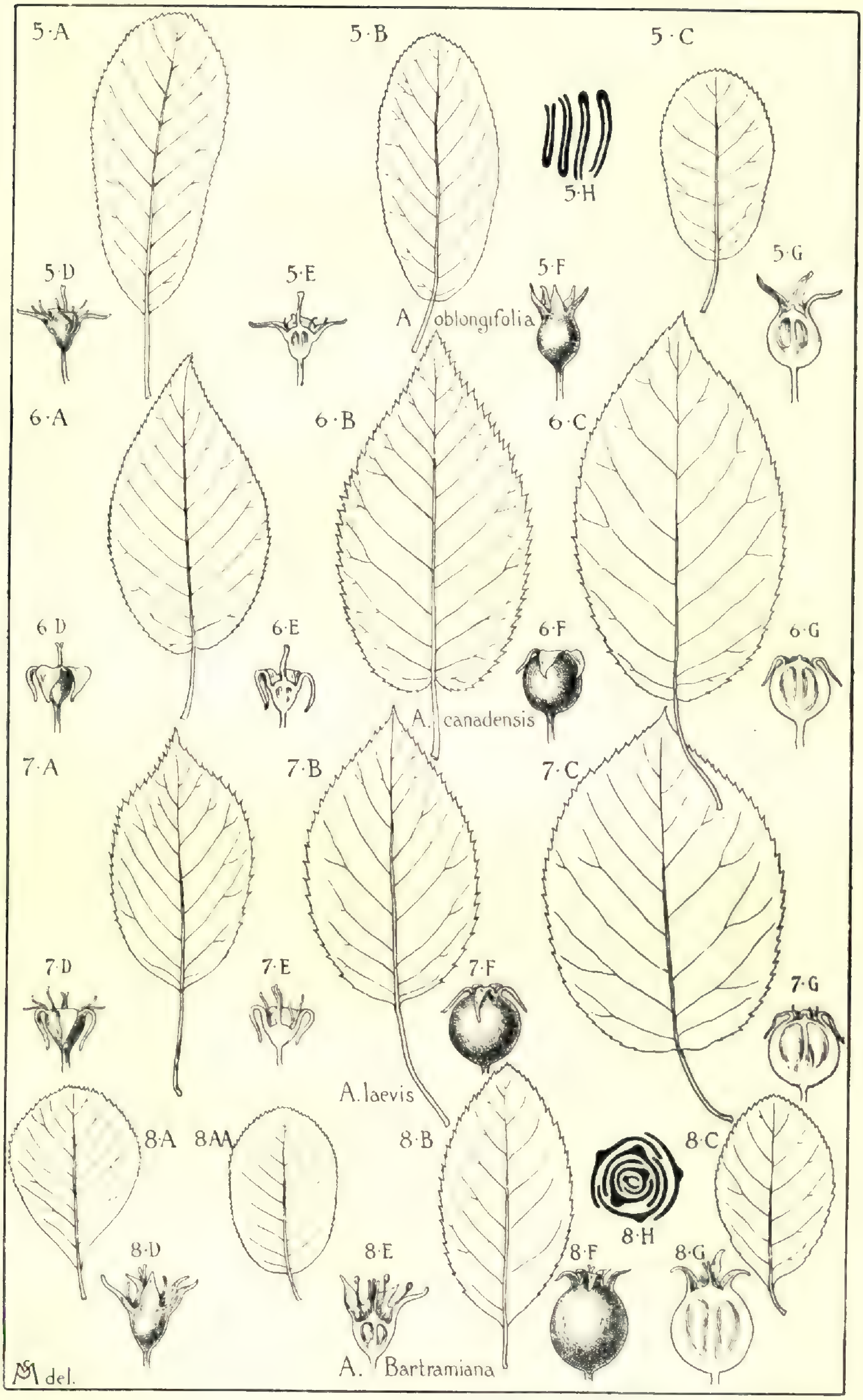
Chicago, Illinois.

[1] For whom the variety is here named, in appreciation of the work done in securing additional specimens and data the past year.

Volume 14, no. 162, including pages 97 to 116 and plate 94, was issued 14 June, 1912.



Typical Leaves, Calyces, Hypanthia and Fruits of North American Amelanchiers.



Typical Leaves, Calyces, Hypanthia, Fruits, and Diagrams of Vernation of North American Amelanchiers.

Rhodora

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NOMENCLATORIAL CHANGES REQUIRED BY SOME GRAMINEAE OF THE SEVENTH EDITION OF GRAY'S MANUAL.

F. Tracy Hubbard.

During my systematic studies in the Family Gramineae I have noted that several generic and specific names are used in the Seventh Edition of Gray's Manual, which do not conform to the International Rules for Botanical Nomenclature ("Vienna Code"). It is the aim of this paper to bring these observations before the users of the Manual.

In most instances the defect arises from a violation of Sect. 7, Art. 50 of the International Rules ("Vienna Code"), which states that a name shall not be rejected on account of the existence of an earlier homonym which is universally regarded as non-valid. These names, taken up by Hitchcock in Gray's Manual, though contrary to the "Vienna Code," remain valid according to the American Code by Sect. V, Canon 16, which states without qualification that "a name is rejected when preoccupied (homonym)." This latter rule, while not without its defects, certainly tends toward a more stable nomenclature, and it seems a pity that it was not adopted at the Vienna Congress. Some of the untenable names in the Manual are changes from the Sixth Edition, but the majority of them are those of species new to the Manual, which have been described by botanists using the American Code and accepted without emendation in the preparation of the Seventh Edition. In two instances the change is necessitated by later knowledge regarding types.

Naturally much of this paper is the result of compilation and of

study of synonymy as given by recent authors, but I have endeavored to weigh all the evidence and to look up the views of earlier authors regarding the names involved. Where possible I have made my own interpretation of the original description and have tried to learn if the type specimens of the species described have been examined recently and, if so, what they have been considered to be. In all instances where changes in nomenclature are made I have satisfied myself that the original descriptions are conformable to the requirements of the "Vienna Code." Certain of the names involved lead to complicated questions, where personal judgment is a factor, and in this respect I wish to express my thanks to Dr. B. L. Robinson, who has been more than kind in his suggestions and advice. My thanks are also due to Prof. A. S. Hitchcock, who has been kind enough to read the paper and offer certain suggestion relating to types, and to Miss M. A. Day for her assistance in questions relating to bibliography.

Erianthus saccharoides Michx.

This name is valid according to the American Code, but not according to the "Vienna Code." The oldest specific name of the plant is *Anthoxanthum giganteum* Walt. Fl. Carol. 65 (1788) and is cited by Michaux Fl. Bor.-Am. **1**: 55 (1803) as a synonym of his species. According to the American Code the specific name *giganteus* cannot be taken up on account of *E. giganteus* Muhl. Cat. 4 (1813); but this does not invalidate its use, when the "Vienna Code" is followed, as *E. giganteus* Muhl. was based on *Andropogon alopecuroides* L. Sp. Pl. 1045 (1753) which equals *E. divaricatus* (L.) Hitchc. Contr. Nat. Herb. **12**: 125 (1908). [Cf. Hitchc. l. c.] Consequently by Sect. 7, Art. 50 of the "Vienna Code" the specific name *giganteus* is available for the species commonly known as *E. saccharoides* Michx.

Erianthus **giganteus** (Walt.) comb. nov. not Muhl. l. c. (1813). Synonymy in part. *Anthoxanthum giganteum* Walt. Fl. Carol. 65 (1788). *E. saccharoides* Michx. Fl. Bor.-Am. **1**: 55 (1803); Watson & Coulter in Gray Man. ed. 6, 637 (1890) excl. syn.; Hitchc. in ed. 7, 93 (1908); Nash in Britt. Man. ed. 3, 68 (1907). *E. alopecuroides* as to descr. Gray Man. 616 (1848) — this is a misapplication of the name by Prof. Gray as his description is that of *E. giganteus* (*E. saccharoides* Michx.) and not of *E. divaricatus* (L.) Hitchc., which has a twisted awn and loose panicle.

PANICUM HEMITOMUM Schultes.

Under this species in Hitchcock and Chase Contr. Nat. Herb. **15** : 322 (1910) [1] the first synonym is *P. Walteri* Ell. Sk. Bot. S. C. & Ga. **1**: 115 (1816). Schultes Mant. **2**: 227 (1824), bases his species, *P. hemitomum* on *P. Walteri* Muhl. Descr. Gram. 108 (1817); this is the second synonym given by Hitchcock and Chase l. c. 323. *P. Walteri* Muhl. was probably described from Elliott's plant, as the specimen in the Muhlenberg Herbarium is labeled "Panicum dimidiatum Walter, Ell. 478" and is evidently a duplicate of Elliott's plant [cf. Hitchc. & Chase l. c. 323]. Both Elliott and Muhlenberg cite *P. dimidiatum* Walt. Fl. Carol. 72 (1788), as a synonym of their species [in fact the herbarium specimens of both are labeled *P. dimidiatum* Walt.— cf. Scribn. U. S. Div. Agrost. Circ. **29**: 4 (1901) and Scribn. & Merr. U. S. Div. Agrost. Circ. **27**: 2 (1900). The name *dimidiatum* antedates all others applied to the species, but it is not advisable to use it because unquestionably it is a misapplication of *P. dimidiatum* L. Sp. Pl. 57 (1753) and not intended as a new species. *P. dimidiatum* L. equals *Stenotaphrum dimidiatum* (L.) Brogn. in Duperry Voy. Coq. Bot. 127 (1828) [cf. Hitchc. Contr. Nat. Herb. **12**: 116 (1908) under discussion of *P. dissectum* L.].

P. Walteri Ell. is well described and the type specimen is known. However, the specific name *Walteri,* of Elliott, is antedated by *P. Walteri* Pursh Fl. **1**: 66 (1814) and *P. Walteri* Poir. in Lam. Dict. Suppl. **4**: 282 (1816) and is consequently invalid according to the American Code. *P. Walteri* Pursh l. c. from the description is evidently a species of *Echinochloa* and is given by Torrey Fl. N. Y. **2** : 424 (1843), as a synonym of *Echinochloa crusgalli* (L.) Beauv. *P. Walteri* Poir. l. c. equals *P. Boscii* Poir. in Lam. Dict. Suppl. **4** : 278 (1816) [cf. Hitchc. & Chase l. c. 317]. Since the older *P. Walteri* Pursh and *P. Walteri* Poir. are invalid, they do not invalidate *P. Walteri* Ell. (Sect. 7, Art. 50 of the "Vienna Code"), and consequently the valid name of what has been known as *P. hemitomum* Schultes is *P. Walteri* Ell.

PANICUM WALTERI Ell. Sk. Bot. S. C. & Ga. **1** : 115 (1816), not Pursh l. c. (1814) nor Poir. l. c. (1816). Synonymy in part: *P. hemitomum* Schultes Mant. **2** : 227 (1824); Hitchc. in Gray Man. ed. 7, 103

[1] I have cited Hitchcock & Chase North American Species of Panicum under the serial title Contr. Nat. Herb. **15** throughout this article.

(1908); Hitch. & Chase Contr. Nat. Herb. **15** : 322 (1910). *P. Curtisii* Chapm. Fl. So. U. S. 573 (1860); Watson & Coulter in Gray Man. ed. 6, 631 (1890). *Brachiaria digitarioides* (Carpenter) Nash in Britt. Man. 77 (1901); ed. 3, 77 (1907).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum verrucosum Muhl.

According to the American Code *P. debile* Ell. Sk. Bot. S. C. & Ga. **1** : 129 (1816), the oldest name applied to the species, is invalid on account of older usage of the specific name *debile*. *P. debile* Desf. Fl. Atlant. **1** : 57 (1798) equals *Digitaria sanguinalis* (L.) Scop. Fl. Carnol. ed. 2, **1** : 52 (1772). *P. debile* Poir. in Lam. Dict. Suppl. **4** : 283 (1816) is based on *P. divaricatum* Michx. Fl. Bor. Am. **1** : 50 (1803), which equals *Festuca nutans* Spreng. Fl. Hal. Mant. 34 (1807) (*F. obtusa* Spreng.) [cf. Hitchc. Contr. Nat. Herb. **12** : 149 (1908)]. Consequently, since the older *P. debile* of Desfontaine and of Poiret have been definitely reduced to synonymy, *P. debile* Ell. is the valid name of the species commonly known as *P. verrucosum* Muhl. (Sect. 7, Art. 50 of the "Vienna Code").

Panicum debile Ell. Sk. Bot. S. C. & Ga. **1** : 129 (1816), not Desf. l. c. (1798), not Poir. l. c. (1816). Synonymy in part: *P. verrucosum* Muhl. Descr. Gram. 113 (1817); Hitch. in Gray Man. ed. 7, 103 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 127 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum stipitatum Nash.

This specific name is antedated by *P. elongatum* Pursh Fl. **1** : 69 (1814), upon which it is based. According to the American Code, *P. elongatum* Pursh is invalidated by *P. elongatum* Salisb. Prodr. 18 (1796). *P. elongatum* Salisb. is, however, based on *P. italicum* L. Sp. Pl. 56 (1753) which equals *Setaria italica* (L.) Beauv. Agrost. 51 (1812). Consequently according to the "Vienna Code" (Sect. 7, Art. 50) *P. elongatum* Pursh,— which is identical with *P. stipitatum* Nash [cf. Hitchc. & Chase Contr. Nat. Herb. **15** : 104 (1908)],— is the valid name.

Panicum elongatum Pursh Fl. **1** : 69 (1814) not Salisb. l. c. (1796).

Synonymy in part: *P. stipitatum* Nash in Scribn. U. S. Div. Agrost. Bull. **17**, ed. 2, 56, fig. 352 (1901); Hitchc. in Gray Man. ed. 7, 105 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 104 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum depauperatum Muhl.

The oldest specific name is *P. strictum* Pursh Fl. **1** : 69 (1814), which is the first synonym given by Hitchcock & Chase Contr. Nat. Herb. **15** : 151 (1910) under *P. depauperatum* Muhl. It is also given as a synonym of *P. depauperatum* Muhl. by Gray Man. 614 (1848) and by many other authors. *P. strictum* Pursh is not valid, according to the American Code, on account of *P. strictum* R. Br. Prodr. 190 (1810). It is valid, however, according to the "Vienna Code" because *P. strictum* R. Br. is conceded, by various authors, equal to *P. marginatum* var. *strictum* Benth. Fl. Austral. **7** : 846 (1878) who gives it as a synonym of his variety. There is also *P. strictum* Roxb. Hort. Beng. 7 (1814), which is a *nomen nudum.* Consequently by Sect. 7, Art. 50 and Sect. 4, Art. 37 the older uses of *strictum* as a specific name are invalid and *P. strictum* Pursh becomes the valid name for what is known as *P. depauperatum* Muhl.

Panicum strictum Pursh Fl. **1** : 69 (1814) not R. Br. l. c. (1810) nor Roxb. l. c. (1814). Synonymy in part: *P. depauperatum* Muhl. Descr. Gram. 112 (1817); Gray Man. 614 (1848); Watson & Coulter in ed. 6, 663 (1890), Hitchc. in ed. 7, 105 (1908); Hitchc. & Chase Contr., Nat. Herb. **15** : 151 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum yadkinense Ashe.

P. yadkinense Ashe in Journ. Elisha Mitchell Soc. **16** : 85 (1900) is based on *P. maculatum* Ashe in l. c. **15** : 44 (1898). This is the oldest name of the species if we except the uncertain *P. dumus* Desv. Opusc. 88 (1831), which is made a questionable synonym of *P. yadkinense* Ashe by Hitchcock and Chase Contr. Nat. Herb. **15** : 195 (1910). There are two older uses of the name *maculatum* neither of which stand in the way of the Ashe usage when the "Vienna Code" is followed.

P. maculatum Aubl. Pl. Guian. **1** : 51 (1775) equals *P. latifolium*

L. Sp. Pl. 58 (1753) [cf. Doell in Mart. Fl. Bras. **2** pt. 2 : 207 (1877) in syn. and Ind. Kew. **2,** pt. 1, 415 (1895)]. *P. maculatum* Reichb. ex Schlecht. & Cham. in Linnaea **6** : 33 (1831) is used in synonymy under *P. divaricatum* 2) *latifolium* and is consequently invalid (Sect. 4. Art. 37 of the "Vienna Code"). Incidentally *P. divaricatum* L. Syst. Nat. ed. 10, **2** : 871 (1759) equals *Lasiacis divaricata* (L.) Hitchc. [cf. Hitchc. & Chase Contr. Nat. Herb. **15** : 16 (1910)]. Since, according to the "Vienna Code," both older uses of the specific name *maculatum* are invalid *P. maculatum* Ashe replaces *P. yadkinense* Ashe. According to the American Code, *P. yadkinense* Ashe remains the valid name.

Panicum maculatum Ashe in Journ. Elisha Mitchell Soc. **15** : 44 (1898) not Aubl. l. c. (1775), not Reichb. ex Schlecht. & Cham. l. c. (1831). Synonymy in part: *P. yadkinense* Ashe in l. c. **16** : 85 (1900); Hitchc. in Gray Man. ed. 7, 107 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 195 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum Wrightianum Scribn.

This species, which belongs next to *P. leucothrix* Nash, is not described in the Manual, but as it has been collected in southern New Jersey [cf. Hitchc. & Chase Contr. Nat. Herb. **15** : 208 (1910)] and at Barnstable, Mass. by Mr. E. W. Sinnott, who reports his locality in Rhodora **14** : 29 (1912), it seems best to speak of it. The authenticity of Mr. Sinnott's specimens is unquestionable, as the writer has specimens in his herbarium and as Mr. Sinnott states that the material was determined by Mrs. Agnes Chase of the Bureau of Plant Industry.

The oldest name applied to this species is *P. strictum* Bosc. in R. & S. Syst. Veg. **2** : 447 (1817), but this name is not available because of *P. strictum* Pursh (1814) which is the valid name of *P. depauperatum* Muhl. [cf. discussion under *P. depauperatum* Muhl.].

The second synonym given by Hitchcock and Chase Contr. Nat. Herb. **15** : 207 (1910), under *P. Wrightianum* Scribn., is *P. minutulum* Desv. Opusc. 87 (1831). According to the American Code the use of the name *minutulum* for this species is invalidated by the older *P. minutulum* Gaud. in Freycinet Voy. Bot. 410 (1826). This equals *Isachne miliacea* Roth Nov. Pl. Sp. 58 (1821) [cf. Hook. f. Fl. Brit. Ind. **7** : 25 (1896)]. According to the "Vienna Code" (Sect. 7,

Art. 50) *P. minutulum* Gaud. does not invalidate *P. minutulum* Desv., which consequently replaces *P. Wrightianum* Scribn.

Panicum minutulum Desv. Opusc. 87 (1831) not Gaud. l. c. (1826). Synonymy in part: *P. Wrightianum* Scribn. U. S. Div. Agrost. Bull. **11** : 44, fig. 4 (1898) & Hitchc. & Chase Contr. Nat. Herb. **15** : 207 (1910); Sinnott in Rhodora **14** : 29 (1912).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum huachucae Ashe Var. silvicola Hitchc. & Chase.

According to the American Code this name is correct, but by the "Vienna Code" (Sect. 6, Art. 48) the varietal name *fasciculatum* (*P. dichotomum* L. var. *fasciculatum* Torr.) must be retained, as the fact that there is a species of the same name (*P. fasciculatum* Sw.) does not make the use of *fasciculatum* as a varietal name invalid. The valid name, consequently, becomes

Panicum huachucae Ashe var. **fasciculatum** (Torr.) comb. nov. Synonymy in part: *P. dichotomum* L. var. *fasciculatum* Torr. Fl. No. & Mid. U. S. 145 (1824). *P. huachucae* Ashe var. *silvicola* Hitchc. & Chase in Robinson in Rhodora **10** : 64 (1908); Hitchc. in Gray Man. ed. 7, 109 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 216 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

Panicum columbianum Scribn.

The oldest name of this species is *P. heterophyllum* Bosc in Nees Agrost. Bras. 227 (1829). This is the first synonym given by Hitchcock and Chase, Contr. Nat. Herb. **15** : 247 (1910). The specific name *heterophyllum* is invalid, according to the American Code, as there are older usages of *heterophyllum*, but these usages do not invalidate its use, according to the "Vienna Code" (Sect. 7, Art. 50) since two are reduced to synonymy and the third is a *nomen nudum* (Sect. 4, Art. 37).

P. heterophyllum Spreng. Neue Entdeck. **3** : 13 (1822) equals *P. pilosum* Sw. Prodr. 22 (1788) [cf. Ind. Kew **2** pt. 1 : 414 (1895)]. Steudel Nom. Bot. ed. 2, **2** : 261 (1841) under *P. pilosum* Sw. gives *Setaria pilosa* Kunth as a synonym and Kunth Rev. Gram. **1** : 47 (1829) under *Setaria pilosa* gives *P. pilosum* Sw: and *P. heterophyllum* Spreng. as synonyms. I cannot find that, at any time since Kunth, anyone has used *P. heterophyllum* Spreng. otherwise than as a synonym

of *P. pilosum* Sw. and consequently it would be inadvisable to consider it as rendering *P. heterophyllum* Bosc invalid. *P. heterophyllum* Muhl. in Trans. Am. Phil. Soc. **3** : 160 (1793) is a *nomen nudum* and is referred to under *P. microcarpon* Muhl. by Hitchcock & Chase l. c. 181 (1910). *P. heterophyllum* Sw. Adnot. Bot. 6 (1829) equals *P. sphaerocarpon* Ell. [cf. Hitchc. & Chase l. c. 251 (1910)]. Consequently, according to the "Vienna Code," *P. heterophyllum* Bosc is the valid name for what has been known as *P. columbianum* Scribn.

Panicum heterophyllum Bosc in Nees Agrost. Bras 227 (1829), not Spreng. l. c. (1822), nor Muhl. l. c. (1793), nor Sw. l. c. (1829). Synonymy in part: *P. columbianum* Scribn. U. S. Div. Agrost. Bull. **7** : 78, fig. 60 (1898); Hitchc. in Gray Man. ed. 7, 112 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 247 (1910).

Panicum columbianum Scribn. Var. thinium Hitch. & Chase

Since the specific name has been altered it is necessary to mention the new varietal combination.

P. heterophyllum Bosc Var. **thinium** (Hitchc. & Chase) comb. nov. *P. unciphyllum* Trin. Var. *thinium* Hitchc. & Chase, Rhodora **8** : 209 (1906). *P. columbianum* Scribn. Var. *thinium* Hitchc. & Chase in Robinson, Rhodora **10** : 64 (1908); Hitchc. in Gray Man. ed. 7, 112 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 248 (1910).

Panicum polyanthes Schultes.

The oldest name for this species is *P. multiflorum* Ell. Sk. Bot. S. C. & Ga. **1** : 122 (1816) [cf. Hitchc. & Chase Contr. Nat. Herb. **15** : 254 (1910) in syn. under *P. polyanthes* Schultes]. According to the American Code *P. multiflorum* Poir. in Lam. Dict. Suppl. **4** : 282 (1816) renders the use of *multiflorum* as the specific name invalid, but by Sect. 7, Art. 50 of the "Vienna Code" *P. multiflorum* Poir. which equals *P. dichotomiflorum* Michx. Fl. Bor. Am. **1** : 48 (1803) [cf. Hitchc. & Chase l. c. 48 (1910)] does not invalidate *P. multiflorum* Ell. Consequently the valid name of the species now known as *P. polyanthes* Schultes is *P. multiflorum* Ell.

Panicum multiflorum Ell. Sk. Bot. S. C. & Ga. **1** : 122 (1816) not Poir. l. c. (1816). Synonymy in part: *P. polyanthes* Schultes Mant. **2** : 257 (1824); Hitchc. in Gray Man. ed. 7, 113 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 254 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

PANICUM ASHEI Pearson.

P. Ashei Pearson in Ashe Journ. Elisha Mitchell Soc. **15** : 35 (1898) is antedated by *P. umbrosum* LeConte in Torr. Cat. Pl. N. Y. 91 (1819). *P. umbrosum* Le Conte is given as a synonym of *P. Ashei* Pearson by Hitchcock and Chase Contr. Nat. Herb. **15** : 301 (1910) and is represented by specimens in the Torrey Herbarium, according to Hitchcock and Chase l. c., who point out that, while the sheet also contains a piece of a culm of *P. dichotomum* L., Le Conte's description (though not applying in all respects) applies better to the two vernal culms. These two vernal culms are what is know as *P. Ashei* Pearson.

Retzius [Obs. **4** : 16 (1786)] describes a plant as *P. umbrosum* which usage of *umbrosum* antedates *P. umbrosum* Le Conte (1819). The Retzius species is, however, given by various authors as a synonym of *P. prostratum* Lam. Tabl. Encycl. **1** : 171 (1791) which equals *P. reptans* L. Syst. Nat. ed. 10, **2** : 870 (1759) [cf. Hitchc. & Chase l. c. 36 (1910)]. Lamarck l. c. under *P. prostratum* cites *P. umbrosum* Retz. as a synonym. Nees, Agrost. Bras. 109 (1829) cites it as a synonym under *P. procumbens* Lam. [As Lamarck apparently did not describe any species under the name of *procumbens,* it is probable that Nees intended to treat *P. prostratum* Lam. especially so as he cites the Lamarck varieties of *P. prostratum*]. Hooker f. [Fl. Brit. Ind. **7** : 34 (1896)] cites *P. umbrosum* Retz. in a note under *P. prostratum* Lam. saying that he (Hooker f.) cannot untangle the synonymy of *P. prostratum* Lam. and *P. villosum* Lam., but seems to lay stress on the synonymy as given by Nees.

As there has been no disposition on the part of any writer from the time of Lamarck (1791) to Hooker f. (1896) to treat *P. umbrosum* Retz. as a valid species it would seem advisable to accept the general belief that it is a synonym of *P. reptans* L. (*P. prostratum* Lam.), in which case (according to Sect. 7, Art. 50 of the "Vienna Code") the valid name of *P. Ashei* Pearson is *P. umbrosum* Le Conte. According to the American Code *P. Ashei* Pearson remains valid.

PANICUM UMBROSUM Le Conte in Torr. Cat. Pl. N. Y. 91 (1819) not Retz. l. c. (1786). *P. Ashei* Pearson in Ashe Journ. Elisha Mitchell Soc. **15** : 35 (1898); Hitchc. in Gray Man. ed. 7, 113 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 301 (1910).

(*To be concluded.*)

Succisa pratensis in Massachusetts.— A small colony of *Succisa pratensis* Moench is established at Riverside, Haverhill, Massachusetts, on the bank of the Merrimack River. It was my good fortune to find this plant on August 22, 1911. Its only American station. according to Gray's Manual, is about Louisburg, Cape Breton Island, In order to verify my own identification I sent a specimen to Mr. C. A. Weatherby at the Gray Herbarium, who sent back word that it was really *Succisa pratensis* and that it had not been reported before from the American continent. It seems probable that the seeds were carried down the river during the spring floods from waste in some of the mill-yards of Manchester, Lowell or Lawrence and deposited at Riverside. If anyone cares to look for this plant he can locate it by going along the shore of the river from Groveland bridge toward Rocks Village on the Haverhill side of the river. The colony is about one fourth of a mile below the bridge and about 100 feet from high-water mark. The plant seems well established although the colony is small, covering perhaps 50 square yards.— J. Richard Lunt, Milton, Massachusetts.

New Stations for Paspalum psammophilum.— In July, 1906, Mr. W. P. Rich, and I collected at Halifax, Massachusetts, a *Paspalum* very different from *P. Muhlenbergii*, the common species of eastern Massachusetts. It had bright bluish-green foliage, the leaves and sheaths pubescent and ciliate; the spikelets also pubescent and about 2 mm. in diameter, rather larger than in the common species. The plants were growing vigorously in the dry sand of the railroad embankment.

Again, September 4, 1911, Mr. Rich and I found an abundance of the same plant beside the highway near West Barnstable railroad station. Also during the same month I collected specimens in Duxbury [1] and Plymouth. Duplicates of the Barnstable plants were sent to the National Herbarium, and identified by Prof. A. S. Hitchcock as *P. psammophilum* Nash. Mr. F. S. Collins found this grass in a sandy field at Eastham in 1910 (Rhodora XIII, 22, 1911), and it has also been found on Nantucket (*Bicknell*), and at Sprague, Franklin and Old Saybrook, Connecticut, according to the recent Connecticut Catalogue. The range "s. N. Y. to Del." given in the

[1] This is the grass reported as *P. setaceum* in Rhodora XIV, 20, 1912.

seventh edition of Gray's Manual may therefore be extended to include Connecticut, Nantucket, Cape Cod and Plymouth County in Massachusetts.

This grass evidently is to be classed with *Panicum Wrightianum, Eupatorium leucolepis, Sclerolepis uniflora* and numerous better-known plants which are characteristic of the pine barrens of the Middle and South Atlantic States. More and more of these are being found in the glacial gravels and sand-plains of southeastern Massachusetts, where the soil and moisture conditions are evidently similar to those of the coastal plain.— CLARENCE H. KNOWLTON, Hingham, Massachusetts.

TWO GRASSES NEW TO NEW HAMPSHIRE.— Among some plants which I collected in Hillsborough County, New Hampshire, in 1911, there are two — a *Panicum* and a *Calamagrostis* — that have not been known hitherto in this State. Through the courtesy of Mr. Walter Deane specimens have been submitted for identification to Mrs. Agnes Chase, who very kindly has compared them with material in the National Herbarium.

The *Calamagrostis*, which I obtained in a grassy meadow in Sharon, New Hampshire, July 20, 1911, is *C. inexpansa* Gray. It occurs in New Jersey and New York, but until now has been unknown in New England. Mrs. Chase writes that my plant "has a less densely flowered panicle than any specimen we have, but the spikelet characters are those of *C. inexpansa* though the glumes are slightly shorter than in most of the specimens, only equalling the lemma instead of being a little longer."

The *Panicum* proves to be *P. commutatum* Schultes. I found it July 2, 1911, growing in a meadow in Peterborough, New Hampshire. It appears to have been taken but once before in New England. Hitchcock and Chase, in their recent monograph on the North American species of this genus, cite one specimen in the National Herbarium, obtained at Wellesley, Massachusetts, in 1899, by Mr. W. P. Rich.— CHARLES FOSTER BATCHELDER, Cambridge, Massachusetts.

GALIUM BREVIPES IN MINNESOTA.— In 1910 *Galium brevipes* Fernald & Wiegand, a small species with very short-pedicelled axillary flowers, and fruits scarcely 1 mm. in diameter, was described [1] from

[1] RHODORA, xii, 78 (1910).

Quebec and Maine. It is, therefore, interesting to find in a package of undetermined material recently received from the National Herbarium *G. brevipes* collected September 1, 1891, by Dr. E. A. Mearns on Pike's Island at Fort Snelling, Minnesota.— M. L. Fernald.

PLANTS APPARENTLY NEW TO THE MAINE CATALOGUE.

Arthur H. Norton.

The following plants, I believe, are without published records for their occurrence in Maine. Specimens of all of them are preserved in the Herbarium of the Portland Society of Natural History.

It may be noted that these are all indigenous American species, of southern rather than northern distribution.

Scirpus planifolius Muhl. In the Herbarium of the Portland Society of Natural History there is a sheet of this species, collected at Wells, Maine, by Rev. Joseph Blake, August, 1881. This was labelled *Fimbristylis capillaris*. The herbarium number is 1458.

Carex lupuliformis Sartwell. This species was collected at Stroudwater, September 22, 1907, by Mr. A. R. Stubbs of Portland. This has been determined by Professor M. L. Fernald.

Acnida cannabina L. On the 16th of September, 1905, I found this plant in several small spots on the brackish marshes on the easterly shore near the mouth of the Presumpscot River, a place known as the Dyke Marshes and about four miles from Portland. I have seen it on several later occasions which shows that it is permanent.

Ludvigia polycarpa Short & Peter. Specimens were taken by Mr. A. R. Stubbs in Deering, Maine, August 28, 1908.

Lilaeopsis lineata (Michx.) Greene. During the meeting of the Josselyn Botanical Society at Brunswick, in 1911, while with a party of the Society, at Winnegance Creek, on August 23, led by Miss Kate Furbish, I came upon a small patch of this plant. Though the patch was small, the plant thickly covered the space. It was well hidden from view by *Spartina glabra alterniflora* which lined the shore.

Portland Society of Natural History,
Portland, Maine.

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A SUGGESTION FOR SUMMER OBSERVATIONS.

Cora H. Clarke.

(Plates 97 to 99.)

Incomplete and imperfect observations on any subject do not enhance the observer's scientific reputation, but they are perhaps of worth by calling to the subject the attention of those whose studies may be of more value. And in the case of grass anthesis, if many persons should happen to make notes on the same grass species, their notes, if agreeing, will give us fixed rules, or, if differing, will show us range of variation in the flowering habits of the species.

With this apology, I offer the result of my own desultory examinations, made in the summer of 1911, having been incited thereto by reading for the first time that, in grasses, "The opening of the flowers caused by the divergence of the two glumes is effected by the lodicules. They become fleshy and succulent and usually spheroidally swollen at base, by means of which they overcome the resistance of the elastic outer glume and move it outward. After fading, which occurs at latest in one to two hours, they shrivel up again into small, thin leaves."

This closing again in "one to two hours" must be one of the hundred lies a lecturer has to tell to make his story straight.[1] Probably it is true for most species, but in *Arrhenatherum elatius* I noted two individual spikelets, the flowers of which kept open twenty-four hours; and two flowers in a marked spikelet of *Poa annua* kept open six hours

[1] A distinguished lecturer at Wood's Hole once remarked: "I never make a straight story in my lecture without feeling I have told a hundred lies."

— both of these, however, were in the house, though the *Poa* was growing in earth. The true test would be to mark individual flowers in natural conditions out of doors — paint, or waterproof ink might be used.

Poa annua is a grass always "on tap." I found the first open flower this year (1912) on April 28, and it will keep in bloom until late fall, and then may be potted and will flower through the winter in the house, while as to time of day, I have found blossoms open out of doors from 3 A. M. (before light) to 6 P. M.[1]

One often finds grass flowers open and not a grain of pollen left in the anthers, which then usually resemble two empty canoes placed back to back. Grasses are wind-fertilized, and Hackel states that they are "usually protandrous, more rarely protogynous (Alopecurus, Anthoxanthum, Spartina)" "The anthers empty most of the pollen at once by turning completely over; when the stigmas project laterally from the pendulous or nodding spikelet they turn upward, and thus are only dusted with the pollen of flowers situated above. Rarely they project from the tip of the spikelet. This occurs in protogynous or monoecious species. The glumes in species of Alopecurus, Anthoxanthum, Phalaris and Phleum open scarcely or not at all during anthesis. In these cases, stigmas and anthers project through a narrow slit."

If I had read the above at the beginning of the summer, it would have saved me many fruitless efforts to find open flowers of *Phleum*. Neither did I find any in *Spartina*, but I found anthers shedding pollen in abundance out of doors, at 10.30 A. M. on a sunny day, and once, bringing a dew-soaked inflorescence into the house at 6 A. M., it shook out the pollen at 10, when the dew had dried.

But the most drenching dew does not seem to hinder the pollen of *Ammophila arenaria* from flying in thick clouds: I found it thus on Aug. 23 at 6.15 A. M. An hour later, returning from my walk, I found the usually trim, terete inflorescence looking positively ragged with the many gaping mouths of the flowers up and down the spikes, the pollen not being all shed, though examining spikes as late as 9 A. M. I found the anthers quite empty. A quotation given by Kunth says "the stigmatic branches do not protrude, and are receptive within

[1] But it flowers most profusely in the early morning — one day in June, at 5 A. M., I counted, on the panicles borne by one root of *Poa annua*, 30 open flowers, there being usually two in the same spikelet.

the still closed glumes, while the undehisced anthers already project slightly from their tips." I did not find the flowers to open readily in the house, though my drawing of the lodicules was made from a spike in a vase [at 6.30 A. M.].

But flowers of *Festuca elatior* do open readily in the house — I noted them at 6, 7 and 8 A. M. and at noon, and those of *Agropyron repens* at 10.30 and 3.30; and out of doors I found them open at 5.30 P. M., back of Magnolia Beach, on a cool, gray day.

The anthesis and pollination of *Arrhenatherum elatius* is fully pictured and described in Kunth, but I was glad to find two panicles, and to see for myself the large lodicules, with unusually long tops.

Elymus virginicus is common at Magnolia, along Raymond St., but through some piece of carelessness, having forgotten the results of previous determinations, I last summer brought it out to *E. canadensis.* Finding flowers open, in a vase in the house at 4 P. M., I drew the lodicules with the scale-like tops fringed. Later, I looked up the Latin description of various lodicules in Kunth's Enumeratio Plantarum, and noticed that he called those of *Elymus canadensis* "nonciliatae," and those of *E. virginicus,* "ciliatae"; I then compared my Raymond St. plants with previously named mounts in my herbarium, and found them to be really *E. virginicus.*

Oats — *Avena sativa,* grew abundantly by stables and roadsides at Magnolia, and as I passed them, at all hours of the day, I gathered the pretty panicles and looked for open flowers, also standing them in vases about the house, but I never caught a blossom open till the morning of September 12, at 6 A. M., when my eye was caught by one open blossom in a glass in the house, with turgescent lodicules, and a half-split anther caught onto one stigma. But if American-grown Oats behave like European, there seems no reason why I should not have found flowers open very often. Out of a number of observers quoted by Kunth, Godron states that the flowers open between 2 and 4 P. M.; Hildebrand that in dry weather, they open in the afternoon or towards evening, but in unfavorable weather, they remain closed, and pseudo-cleistogamous autogamy takes place; Kirchener says that anthesis begins in the afternoon when the weather is favorable and lasts till evening; Körnicke says, many varieties, besides opening in the P. M. do so also in the A. M. beginning in favorable weather, before 8 A. M. and continuing some hours, but the bulk of the flowers always open after mid-day. De Vries tells us that

"Wheat, barley and oats are self-fertile and do not mix in the field through cross-pollination."

In grass-species that are the same as those of Europe, I look with interest to see if the hours of anthesis given for Europe are the same in America; Kunth names 11 A. M. for *Agrostis*, and on Copley Square at that hour, I gathered a panicle of *Agrostis alba* with open flowers, and taking it to a Botany Class, we had the satisfaction of seeing the tiny, but turgescent lodicules. The much-observed *Dactylis glomerata* is said by one man to open at 6 and 7, by another man, 6 and 9; here, I have found them at 6 and 7 A. M.

By the end of the summer, I had examined only nine or ten of the turgescent lodicules of grass-species belonging to the Sub-family *Poacoideae*, and four or five belonging to that of the *Panicoideae*, an insufficient basis for a theory, yet I noticed that the lodicules of the former had thin, scale-like tops to their turgescent bases, while of the latter the lodicules of *Setaria verticillata, Digitaria humifusa* and *D. sanguinalis* were like pebbles, round or oblong, while those of *Echinochloa crus-galli* were broad, and square at the top; fortunately remembering that Dr. Percival Lowell tells us that "nothing is so rash as a general denial, except a particular statement," I looked in Kunth's drawings of lodicules in Enumeratio plantarum, and there found two or three of the *Poacoideae* that had truncate tops, not tapering up into a lanceolate tip — these were the "squamulae in unam connatae" of *Glyceria aquatica* and *Glyceria fluitans*, and the squamulae with ciliate tops of *Andropogon halepensis*.

I found the flowers of *Setaria verticillata* and *S. glauca* open in July at about 6 A. M.; those of *Digitaria humifusa* I found open from 4 to 5 A. M., but think they were all closed by 7 — that, however, was on an intensely hot day (July 4, 1911). From 7 to 8 A. M. the little mouths of *Digitaria sanguinalis* open up and down the freshly emerged "fingers" that have scarcely begun to separate from each other. A quotation from Knuth informs us that the "stigmas protrude simultaneously with the anthers, so that at first only self-pollination is possible." I noticed that the neutral flower has as well-developed turgescent lodicules as the perfect flower.

Flowers of *Echinochloa crus-galli* I found open, in the house, from 8 to 9 A. M., with lodicules so different from those of any other grass-species that I have examined, that I shall seek for the earliest blooming panicle this year, to verify my drawings.

Although to see the lodicules thoroughly requires a compound microscope (binocular preferable) a hand-lens shows their presence, and enables one also to make accurate and useful observations as to hours of anthesis, duration of anthesis, time required for emptying the anthers, and facts about the stigmas. A folding chart might be made of paper ruled in squares, with the hours and half-hours of the day on top, and names of grass-species observed, on the left side, with space for notes as to whether the atmosphere is dry or damp. A v might represent an open flower, dots stand for pollen being shed, and a fringed line represent stigmas in good condition.— suggestions upon which students will soon learn to improve.

NOTE: When I wrote the above account of my last summer's observations on grass anthesis, I hoped it would appear early enough in the season to suggest to others to investigate the interesting subject for themselves. I fear that by the end of September, there will not be many grass-species in bloom, but I am sincerely glad of a delay which enables me to add some of the results of my more recent observations, extending, modifying or reversing those of last year.

I stated that *Poa annua* can be found in bloom at any hour of the day, but I find that by far the greater number of blossoms open in the early morning, say from 3 to 7 A. M. On one plant in my border, I counted about 30 spikelets with open flowers — 2 or 3 in each spikelet.

Last summer, I only once found an oat blossom open; this year, I have found them open often, both in a vase in the house, and out of doors,— the latter was in the afternoon.

Last year I found no open flowers of *Glyceria canadensis;* this year, I found many; the time was 7 A. M. on July 6th. I have also examined the lodicules of *Glyceria grandis*, *G. borealis*, *G. acutiflora* and *G. pallida*, all of which species grow at Magnolia, though I do not remember seeing *G. grandis* here before this summer. The lodicules and stigmas of *G. pallida* I could not distinguish from those of *Poa annua,* but the other four have stigmas differing from the usual grass-type, and lodicules square-topped, that is, no uninflated scale-like top. Sometimes, under the microscope, they take the form of those "bracket-fungi" that grow on tree-trunks. I found *Glyceria pallida* with open flowers at 11 A. M.; in the afternoon, many more opened in a vase in the house, and next morning, several were open, the pretty red-brown anthers contrasting pleasingly with the pale green of the spikelets.

The lodicules of *Danthonia spicata* are also of the square-topped type. I found flowers open on July 2nd, at 10 A. M.

When a grass-species begins to bloom, the flowers at the top of the panicle open first, but if the spikelets are many-flowered, anthesis begins with the lowest flower in each spikelet; when each little mouth is closed again, the shrivelled anthers are left outside, so that one can usually tell, by looking at a spike or panicle, even if no flowers are open, whether the plant is coming into bloom or passing out of bloom. On August 14th, I brought home a few young culms of *Andropogon furcatus*; next morning a row of from 4 to 8 little mouths was open in the upper part of each spike, a curling stigma protruded on each side, and a fringe of pendulous golden anthers (3 from each flower) contrasted with the gray and purple color of the grass. Here again I found the flat-topped type of lodicule, the pair meeting in front and then each extending back along the side of the ovary. The pollen was shaken out between 6 and 8 A. M. I have only seen grass-pollen fly in clouds when the grass is touched or jarred,— whether it appears in a visible cloud when the grass is blown upon by the wind, I do not know.

Some grasses seem to open all their flowers at once —*Deschampsia flexuosa*, for instance. On July 3rd at 7 A. M. I found a panicle on which all but one or two flowers were wide open. I suppose that accounts for the species passing by so quickly. *Arrhenatherum*, of which there was an abundance here, this season (1912) also passed all too quickly through its blooming period, and so did *Calamagrostis canadensis*, and many other grasses; per contra *Glyceria pallida* has been in bloom 7 weeks already.

I have examined turgescent lodicules of various species of *Panicum*, e. g., *P. latifolium*, *P. virgatum*, *P. agrostoides*, and *P. capillare*, and find the general plan the same, curving in front, with a flattish top, and a projection extending backward on each side of the ovary, part of each lodicule being outside the edge of the palet and part inside. Kunth describes the lodicules of *P. virgatum* as follows — "Squamulae duae, late cuneatae, apice oblique truncatae et sinuatae subbilobae glabrae, ovario triplo breviores." I found this handsome species at Manchester, Mass., not far from the R. R. Station, growing near salt water; at noon, Aug. 13th, a warm, sunny day, many flowers were open, and on the panicles I took home, I could find a few open flowers all through the next day, though the most abundant anthesis was about

noon (some of the open flowers were the staminate ones, some the fertile). Each had its pair of lodicules; but on the third day, the flowers did not open so well. I notice that grasses with hard, stiff culms do not open their flowers well in the house.

As lodicules lie between the ovary and the lemma, to see them well I turn the lemma back against the pedicel, nip the two in stage forceps and put them under the inch objective of my binocular; then I can twist and turn them about, their appearance varying much according to the angle from which one regards them, also according to degree of turgescence; perhaps this explains why the lodicules of *Digitaria sanguinalis* do not look to me this year as I drew them last year! Then they looked to me like round pebbles, and now they appear square-cornered! But that the neutral flower has a pair of them as well as the fertile, remains an uncontrovertible fact.

Boston, Massachusetts.

Explanation of Plates.

Plate 97.

1. *Poa annua*, lodicules, stamens and stigmas, as seen in the bud.
2. *Poa annua*, lodicules and ovary, in the open flower; one stamen left, with an empty anther; Nov. 17th, 5 A. M. (in pot in house).
3. *Poa annua*, lodicules reduced to scales again; grain nearly ripe; anthers and dried-up stigmas pushed to top of flower.
4. *Festuca elatior*, with turgescent lodicules, ovary, one stamen, and base of two other filaments and of the two styles; Aug. 12th, 7.30 A. M.
5. *Avena*, turgescent lodicules, bristly ovary, base of the two stigmas, with one partly-dehisced anther caught onto one of them; Sept. 12th, 6 A. M.
6. *Ammophila arenaria*, turgescent lodicules; Aug. 20th, 6.30 A. M.
7. *Arrhenatherum elatius*, turgescent lodicules; Aug. 22nd, 10.30 A. M.
8. *Elymus virginicus*, turgescent lodicules; Aug. 6, 4 P. M.

Plate 98.

1. *Setaria verticillata*, cluster of four spikelets, flowers more or less open.
2. *Setaria verticillata*, part of single spikelet, showing turgescent lodicules, styles, stigmas, two anthers, and a bristle; July 6th, 5.30 A. M.
3. *Echinochloa crus-galli*, turgescent lodicules, ovary, bases of two styles, three filaments and the palet; Sept. 16th, 8 A. M.
4. *Echinochloa crus-galli*, a soaked-out flower bud; shows two young, scale-like lodicules, two young stamens, and base of palet.
5. *Digitaria sanguinalis*, turgescent lodicules, etc.; Sept. 12th, 8 A. M.
6. *Digitaria humifusa*, part of spikelet, turgescent lodicules, styles, stigmas, and three empty anthers; July 4th, 5 A. M.
7. *Digitaria humifusa*, part of a raceme, with spikelets more or less open, showing anthers and stigmas.

Plate 99.

1. *Glyceria acutiflora*, lodicules, united into one; ovary, and base of palet; July 2nd, 6 a. m.
2. *Glyceria grandis*, united lodicules, ovary, styles, and base of curious stigmas; July 15th, 5 a. m.
3. *Glyceria canadensis*, ovary, lodicules and base of palet; July 6th, 7 a. m.
4. *Glyceria pallida*, lodicules, ovary and base of palet; July 7th, 4 p. m.
5. *Danthonia spicata*, lodicules, ovary and base of palet; July 2nd, 10 a. m.
6. The same, side view.
7. *Distichlis spicata;* staminate flower; lodicules, base of palet and of the 3 filaments. Aug. 14th (hour not recorded).
8. *Andropogon furcatus*, base of palet, and lodicules embracing the ovary, viewed from above; Aug. 14th, 9 a. m.
9. *Andropogon furcatus*, lodicules, and ovary viewed from the rear or palet-side;

10, 11, and 12. *Panicum capillare*, ovary, lodicules and palet, from different points of view; 10 to 11 a. m.

NOMENCLATORIAL CHANGES REQUIRED BY SOME GRAMINEAE OF THE SEVENTH EDITION OF GRAY'S MANUAL.

(*Continued from page 173.*)

F. Tracy Hubbard.

Panicum Scribnerianum Nash.

Section V, Canon 16, upholds this name when the American Code is followed, but according to Sect. 7, Art. 50 of the "Vienna Code" *P. macrocarpon* Le Conte in Torr. Cat. Pl. N. Y. 91 (1819) which equals *P. latifolium* L. Sp. Pl. 58 (1753) [Cf. Hitchc. & Chase Contr. Nat. Herb. **15** : 314 (1910)] does not render invalid *P. macrocarpon* Torr. Fl. No. & Mid. U. S. 143 (1824), which is the oldest name of the species [cf. Hitchc. & Chase l. c. 283 (1910)]. Consequently *P. Scribnerianum* Nash becomes *P. macrocarpon* Torr.

Panicum macrocarpon Torr. Fl. No. & Mid. U. S. 143 (1824) not Le Conte l. c. (1819). Synonymy in part. *P. Scribnerianum* Nash Bull. Torr. Bot. Cl. **22** : 421 (1895); Hitchc. in Gray Man. ed. 7, 115 (1908); Hitchc. & Chase Contr. Nat. Herb. **15** : 283 (1910).

For complete synonymy cf. Hitchc. & Chase l. c.

TRIDENS R. & S.

The genus *Tridens* of Roemer and Schultes [Syst. Veg. **2** : 34, 599 (1817)] in its commonly accepted sense is antedated by *Tricuspis* Beauv. Agrost. 77, t. 15, fig. 10 (1812). The generic description of *Tricuspis* is fairly good and its identity is unquestionable. It is commonly cited as a synonym of *Tridens* [in fact it is given as a synonym by Roemer and Schultes l. c. 34] when that genus is separated from *Triodia* R. Br. According to the American Code *Tricuspis* Beauv. is untenable on account of the older *Tricuspis* Pers. Syn. **2** : 9 (1807), but by Sect. 7, Art. 50 of the "Vienna Code" *Tricuspis* Pers. which equals *Crinodendron* Molina, Saggio Chile 179 (1782) [a genus of *Elaeocarpaceae*] does not invalidate *Tricuspis* Beauv.

Beauvois after describing his genus cites *Poa coerulescens* Mich. [should be Michx.] and gives his combination *Tricuspis Novaeborocensis* Nob. without description. According to Ind. Kew. **2** pt. 1, 571 (1895) *Poa coerulescens* Michx. ex Kunth is described in Kunth Enum. Pl. **1** : 319 (1833) in syn., but it also occurs in synonymy in Kunth Rev. Gram. **1** : 108 (1829); in both cases under *Uralepis cuprea* Kunth. In Rev. Gram. there is a plate (t. 68) which agrees very fairly with Beauvois' illustration.

Kunth in Enum. Pl. **1** : 319 (1833) among other synonyms of his *Uralepis cuprea* cites *Poa coerulescens* Michx. [upon which Beauvois bases his genus *Tricuspis*]; *P. seslerioides* Michx. Fl. Bor. Am. **1** : 68 (1803); *P. quinquefida* Pursh Fl. **1** : 81 (1814); *Triodea cuprea* Jacq. Eclog. Gram. **2** : 21, t. 16 (1814) and *Tricupis noveboracensis* Beauv. Agrost. 77 (1812) with a question mark.

Triodia cuprea Jacq. is the name used for the first species of *Triodia* by Watson & Coulter in Gray Man. ed. 6, 657 (1890) while in the first edition we find Prof. Gray using *Tricuspis seslerioides* Torr. with the following synonyms: *Poa flava* L., *P. seslerioides* Michx., *P. quinquefida* Pursh and *Windsoria poaeformis* Nutt. *Tricuspis seslerioides* is given as a synonym of *Triodia cuprea* Jacq. in edition six and this in turn is shown to be a synonym of *Tridens flavus* (L.) Hitchc. RHODORA **8** : 210 (1906). This is the first species under *Tridens* in Gray Man. ed. 7, 149 (1908).

This chain of equivalents shows conclusively that the type species of *Tricuspis* Beauv. is unquestionably the same as *Tridens flavus* (L.) Hitchc. and consequently the older *Tricuspis* Beauv. (1812) replaces *Tridens* R. & S. (1817).

Tricuspis Beauv. Agrost. 77, t. 15, fig. 10 (1810); Gray Man. 589 (1848) in part, excl. § 2 *Triplasis*. *Tridens* R. & S. Syst. Veg. **2** : 34, 599 (1817); Hitchc. in Gray Man. ed. 7, 149 (1908). *Windsoria* Nutt. Gen. No. Am. Pl. **1** : 70 (1818). *Triodia* R. Br. § 1 as used by Watson & Coulter in Gray Man. ed. 6, 657 (1890).

Tricuspis **flava** (L.) comb. nov. Synonymy in part: *Poa flava* L. Sp. Pl. 68 (1753). *P. seslerioides* Michx. Fl. Bor. Am. **1** : 68 (1803). *Tricuspis novaeborocensis* Beauv. Agrost. 77, t. 15, fig. 10 (1812). *Poa quinquefida* Pursh Fl. **1** : 81 (1814). *Triodia cuprea* Jacq. Eclog. Gram. **2** : 21, t. 16 (1814); Watson & Coulter in Gray Man. ed. 6, 657 (1890). *Tridens quinquefida* R. & S. Syst. Veg. **2** : 599 (1817). *Tricuspis seslerioides* Torr. Fl. No. & Mid. U. S. 118 (1824); Gray Man. 589 (1848). *Tridens flavus* (L.) Hitchc. Rhodora **8** : 210 (1906); Hitchc. in Gray Man. ed. 7, 149, fig. 146 (1908).

Tricuspis stricta (Nutt.) Gray in Proc. Acad. Sci. Phila. **1862** : 335 (1863). Synonymy in part: *Windsoria stricta* Nutt. in Trans. Am. Phil. Soc. **5** : 147 (1837). *Triodia stricta* Benth ex Vasey Ill. No. Am. Grasses, **1** pt. 2, t. 38 (1891). *Tridens strictus* (Nutt.) Nash in Small Fl. So. E. U. S. 143, 1327 (1903); Hitchc. in Gray Man. ed. 7, 149 (1908).

Glyceria Torreyana (Spreng.) Hitchc.

Since the preparation of his manuscript for the seventh edition of Gray's Manual Prof. Hitchcock has been abroad and has made extensive studies of the types of American grasses. This has thrown new light on a number of species and has made the change of certain names necessary. *G. Torreyana* (Spreng.) Hitchc. is an instance of this. A study of the type specimen of *Panicum melicarium* Michx. Fl. Bor. Am. **1** : 50 (1803) has shown it to be what has commonly been known as *G. elongata* Trin. in Mem. Acad. St. Petersb., ser. 6, **4** pt. 2, 58 (1836) [cf. Hitchc. Contr. Nat. Herb. **12** : 149 (1908)]. *G. elongata* Trin. has been reduced to a synonym of *G. Torreyana* (Spreng.) Hitchc. in Rhodora **8** : 211 (1906). Consequently as Michaux's name is the oldest we must accept it for our species.

Glyceria **melicaria** (Michx.) comb. nov. Synonymy in part: *Panicum melicarium* Michx. Fl. Bor. Am. **1** : 50 (1803). *Poa Torreyana* Spreng. Neue Entdeck. **2** : 104 (1821). *Poa elongata* Torr. ex Spreng. l. c. 104 (1821) in syn. *G. elongata* (Torr.) Trin. in Mem. Acad.

St. Petersb., ser. 6, **4** pt. 2 (Gram. Suppl.) 58 (1836); Gray Man. 593 (1848); Watson & Coulter in ed. 6, 667 (1890). *Panicularia elongata* (Torr.) Ktze. Rev. Gen. **2** : 783 (1891). *Glyceria Torreyana* (Spreng.) Hitchc. Rhodora **8** : 211 (1906); Hitchc. in Gray Man. ed. 7, 158 (1908). *Panicularia melicaria* (Michx.) Hitchc. Contr. Nat. Herb. **12** : 149 (1908).

Hystrix Moench.

Unfortunately the generic name was changed from *Asprella* Willd. of the sixth edition of the Manual to *Hystrix* Moench in the seventh. While Willdenow was not the oldest authority for the name *Asprella* or *Asperella,* as it should be spelled, his genus stood for the same plants as the older *Asperella* Humb. in Roem. & Usteri Mag. **7** : 5 (1791). According to the American Code *Asperella* Humb. is invalidated by the older *Asprella* Schreb. in L. Gen. Pl. ed. 8, **1** : 45 (1789). *Asprella* Schreb., however, equals *Homalocenchrus* Mieg. in Act. Helv. Phys-Math. **4** : 307 (1760) which in turn is a synonym of *Leersia* Sw. Prodr. 21 (1788). *Leersia* Sw. is one of Harms' list of *nomina conservanda.* Consequently *Asprella* Schreb. does not invalidate *Asperella* Hubm. (Sect. 7, Art. 50 of the "Vienna Code.").

Humboldt goes into a lengthy discussion of *Elymus hystrix* L. Syst. Pl. ed. Reich. **1** : 234 (1779) which is the same as *E. hystrix* L. Sp. Pl. 560 (1753) and points out wherein this species differs from the genus *Elymus* L. He forms his genus correctly and gives a species *A. hystrix* basing it on *Elymus hystrix* L. Syst. Pl. ed. Reich. **1** : 234 (1779). Furthermore he refers to the older *Asprella* Schreb. and states that Schreber informs him that his (Schreber's) genus is a synonym of *Homalocenchrus* Mieg.

Asperella Humb. in Roem. & Usteri Mag. **7** : 5 (1790) not Schreb. l. c. (1789). *Hystrix* Moench Meth. 294 (1794); Hitchc. in Gray Man. ed. 7, 170 (1908). *Asprella* Willd. Enum. Pl. Hort. Berol. 132 (1809); Watson & Coulter in Gray Man. ed. 6, 674 (1890). *Gymnostichum* Schreb. Beschr. Gräs. **3** : 127, t. 47 (1810); Gray Man. ed. 2, 571 (1856); ed. 5, 639 (1867). *Elymus* § *Gymnostichum* Gray Man. 604 (1848). ? *Stenostachys* Turcz. in Bull. Soc. Natural. Mosc. **35** pt. 2, 330 (1862).

Asperella hystrix (L.) Humb. in Roem & Usteri Mag. **7** : 5 (1790). Synonymy in part: *Elymus hystrix* L. Sp. Pl. 560 (1753);

Gray Man. 604 (1848). *Hystrix patula* Moench Meth. 294 (1794); Hitchc. in Gray Man. ed. 7, 170 (1908). *Asprella Hystrix* Willd. Enum. Pl. Hort. Berol. 132 (1809); Watson & Coulter in Gray Man. ed. 6, 674 (1890). *Gymnostichum Hystrix* Schreb. Beschr. Gräs. **3**: 127, t. 47 (1810); Gray Man. ed. 2, 571 (1856); ed. 5, 639 (1867). *Hystrix Hystrix* Millsp. Fl. W. Va. 474 (1892); Nash in Britt. Man. ed. 3, 158 (1907).

Cambridge, Massachusetts.

THE INLAND VARIETY OF SPIRAEA TOMENTOSA.

M. L. Fernald.

In looking over a package of plants from Wisconsin I was recently impressed with the aspect of a specimen labeled *Spiraea tomentosa* L. In the almost simple and somewhat remote branches of its inflorescence it contrasted with the common form of the species in the Atlantic States, where the branches of the inflorescence are mostly compound, bearing the flowers often in small glomerules so closely crowded as to give the whole thyrsus a very dense appearance. Examination of all the material at hand showed that generally on the Coastal Plain and in the Atlantic States *Spiraea tomentosa* agrees in having the branches of the panicle densely flowered so that it is difficult to see distinctly the individual pedicels; while the material from the Appalachian Mountain system (West Virginia, North Carolina and South Carolina) as well as that from Wisconsin and Minnesota and a single sheet from southeastern Virginia agree in having the flowers less crowded so that the pedicels are distinctly visible and, though in very young material it is naturally difficult to make out this character, it is readily determined in all flowering and fruiting specimens. Another character seems to accompany that of the inflorescence. In all the fruiting material from the Coastal Plain and from the lower levels of the coastal States the follicles are so densely lanate that only in old or weather-beaten specimens can the surfaces of the follicles be seen; but in all the fruiting specimens of the more inland plant, even in inflorescences with the lowest branches still in anthesis, the com-

paratively short (not lanate) tomentum is promptly deciduous so that the lustrous and glabrate surfaces of the follicles are apparent. Attempts to find other characters have failed for in foliage the two plants closely simulate one another, the leaves of both varying in outline from lanceolate to ovate-oblong, with the tomentum of the lower surface from white to rufous; and occasional individuals from the coastal region have an open inflorescence and distinct pedicels but lanate follicles. The writer therefore does not feel justified at present in treating the plants as distinct species; but as geographic varieties they are well marked and deserving of recognition.

Judging from the Linnean description of *Spiraea tomentosa* which came from Philadelphia (*Kalm*) and was compared with *S. salicifolia* in the following terms: *Differt a praecedenti*. . . .racemo *terminali composito densiori longiori*," [1] there is no question that he meant the densely flowered shrub of the Coastal Plain and adjacent regions; but the Plukenet plate of "*Ulmaria pentacarpos, integris serratis foliis parvis subtus incanis, virginiana*," [2] cited by Linnaeus as belonging to *Spiraea tomentosa* has the open inflorescence and slender pedicels of the more inland shrub.

In his *New Flora* Rafinesque divided *Spiraea tomentosa* into five species with the characteristic comment: "All the above sp. agree in nothing but the tomentous leaves beneath, to deem them all varieties would be preposterous, as no character including them all could be found." Besides true *S. tomentosa* Rafinesque defined *S. ferruginea* with "flowers subsessile"; *S. glomerata* with "flowers subsessile glomerate"; *S. parvifolia* with "panicle spicate glomerate, flowers sessile"; and *S. rosea* with "panicle lax, peduncles [pedicels] as long as calix — West Kentucky to Alabama, disc. by Mrs. Holley, a beautiful shrub with fine rosate flowers, it deserves to be deemed a peculiar sp. by narrow leaves not white beneath, and lax rose flowers." [3] From the description and the range of Rafinesque's *S. rosea* there can be no question that he had the more loosely flowered extreme of *S. tomentosa*, with glabrate follicles; but the shrub cannot be separated from typical *S. tomentosa* "by the narrow leaves not white beneath" since the foliage varies in both these characters as much as that of true *S. tomentosa;* and, as already stated, the characters of the in-

[1] L. Sp. Pl., 489 (1753).
[2] Pluk. Alm., 397, t. 321, f. 5.
[3] Raf. New Fl., iii. 62, 63 (1836).

florescence, pedicels and follicles, although ordinarily well marked, show such transitions as to indicate that *S. rosea* is an extreme variety of *S. tomentosa* rather than a distinct species. It should be called

Spiraea tomentosa L., var. **rosea** (Raf.) n. comb. *S. tomentosa* L. Sp. Pl. 489 (1753) as to the Plukenet plate. *S. rosea* Raf. N. Fl. iii. 62 (1836).— The following specimens are characteristic. West Virginia: Elkins, Randolph Co., *Greenman*, no. 188. North Carolina: Biltmore, *Biltmore Herb.* no. 1247*b*. South Carolina: definite station not given, *M. A. Curtiss*. Wisconsin: Milwaukee, *Lapham*, Polk Co., *C. F. Baker;* Camp Douglas, *E. A. Mearns*, no. 336. Minnesota: St. Paul, *Hale*; Chicayo Co., *B. C. Taylor*.

Gray Herbarium.

SISYMBRIUM OFFICINALE IN THREE STATES.

Sidney F. Blake.

My first meeting with the typical form of *Sisymbrium officinale* (L.) Scopoli was on 13 July, 1910, when I collected three plants (sheet 1295, my herb.) along a railroad at St. Paul, Minnesota. Not recognizing its identity at the time, I failed to note whether other individuals of the species were present. So far as I am aware, the typical form has not been reported from the state since the difference between our two forms was first pointed out by Dr. Robinson some years ago.

Since that time I have twice collected the plant in Stoughton, Massachusetts. On 4 July, 1911, a single plant, growing with many of var. *leiocarpum* DC., was collected on a dump (sheet 2823). On 13 July, 1912, just two years after my first meeting with the species, four specimens were taken, found, together with many glabrous-fruited ones, in dry soil in a house-yard, perhaps a mile from the dump at which it had previously been taken.

On 27 July, 1911, Mrs. N. F. Flynn showed me at Starr Farm, Burlington, Vermont, a colony of Hedge Mustard in which she had noticed three days before a plant or two with pubescent pods. Going over the colony more carefully, we counted some forty-eight plants of

true *S. officinale*, which according to my notes "far outnumbered the variety *leiocarpum* which was also present." A number of plants were collected. This occurrence, the first indubitable one for the state, led me to watch for the plant thereafter, and I was rewarded by two more "finds," though of very small colonies. On 30 July, in a pasture in Shelburne, not far from Shelburne Pond, I found and collected three plants of the type. I do not recall that any individuals of the variety were present. On 2 August a solitary plant (sheet 3580) was taken in a field near a farmhouse in Colchester, near Barney Point. All these Vermont records have been briefly published by Mrs. Flynn in Bull. 7, Vermont Botanical Club, p. 16, 17 (May, 1912).

In a comparison of the twenty-six plants of *Sisymbrium officinale* now in my possession with a number of specimens, mostly freshly picked, of var. *leiocarpum*, other differences than the pod-character have appeared. In the first place, in *S. officinale* the pedicels and axis of the main spike-like inflorescence, as well as of the usually horizontal lateral branches (which in both forms so generally come off at or above the middle of the stem, except in case of an injury to the main axis lower down,— in which event several ascending branches develop from the upper leaf axils, much as in *Lactuca* under similiar conditions,— that one of the St. Paul specimens, only 25 cm. high, with four well developed branches in its first five cm. of height, seems worthy of notice on this account) are more or less densely pubescent with the same short spreading hairs as are the pods. In var. *leiocarpum* the pedicels, like the pods, are glabrous, while the flowering axes are glabrous except for a few scattered enlarged retrorse hairs with swollen usually purplish bases, reminding one of miniature *Rubus* prickles (which also occur in the type, among the much more numerous smaller hairs). Similiar hairs occur on the main stem in both forms, but in true *S. officinale* they are again intermixed with smaller hairs, far outnumbering them, similar to those on the pods.

A few further differentiae of more doubtful import may be mentioned. The runcinate lower leaves of both forms are indistinguishable, but in *S. officinale* the hastately three-lobed, or even unlobed and linear-lanceolate, leaves of the flowering parts are appressed-pubescent, sometimes densely so, above and beneath, whereas the variety has these leaves glabrous or with a few hairs on the lower surface, rarely on the upper. Again, none of the *S. officinale* has the purple of the stem so extensive as it very often is in the variety, the

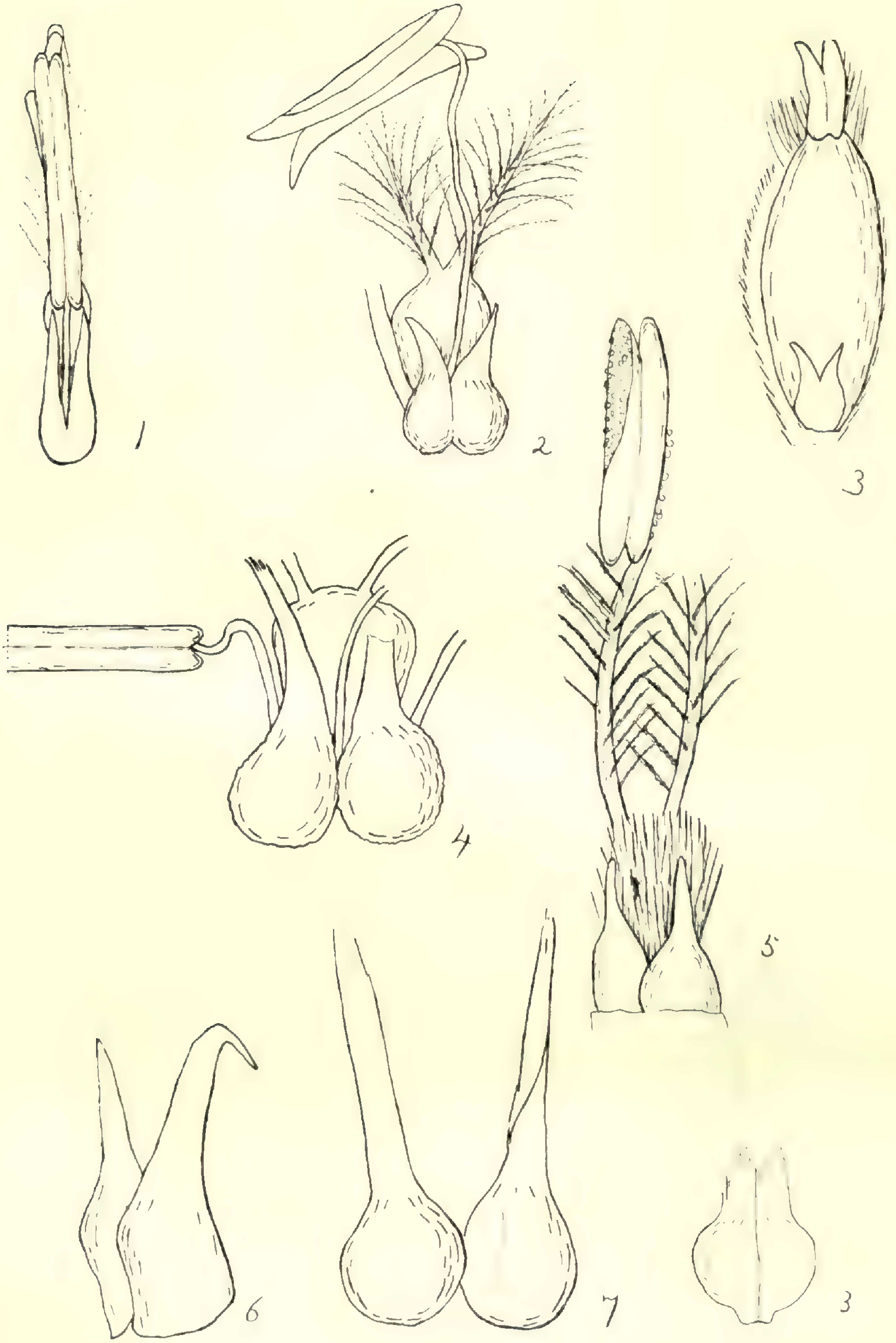
color being present only at its base, although in this respect the plants do not differ from some specimens of the variety. Finally, *S. officinale* seems, so far as my experience goes, to be the smaller plant of the two; my tallest individual is only about 50 cm. high, while the variety is almost always taller than this. Whether this character would hold in a larger series of specimens I am not able to say.

Stoughton, Massachusetts.

A Purple-fruited Ash.— In June, 1911, Mrs. H. K. Morrell sent from Gradiner, Maine, a branch of *Fraxinus americana* L. with deep reddish-purple fruit with a query as to its identity and the remark that "ours about the house have green wings and these red." The present writer then made it a point to watch the White Ash in the neighborhood of Boston and, although the majority of trees bear green or greenish-yellow fruit, occasional colonies were found having the fruit a beautiful purple, which renders the trees conspicuously different in aspect from the ordinary greenish-fruited form. The purple-fruited form seems not to have been distinguished but it is so pronouncedly different in aspect that it deserves the designation:

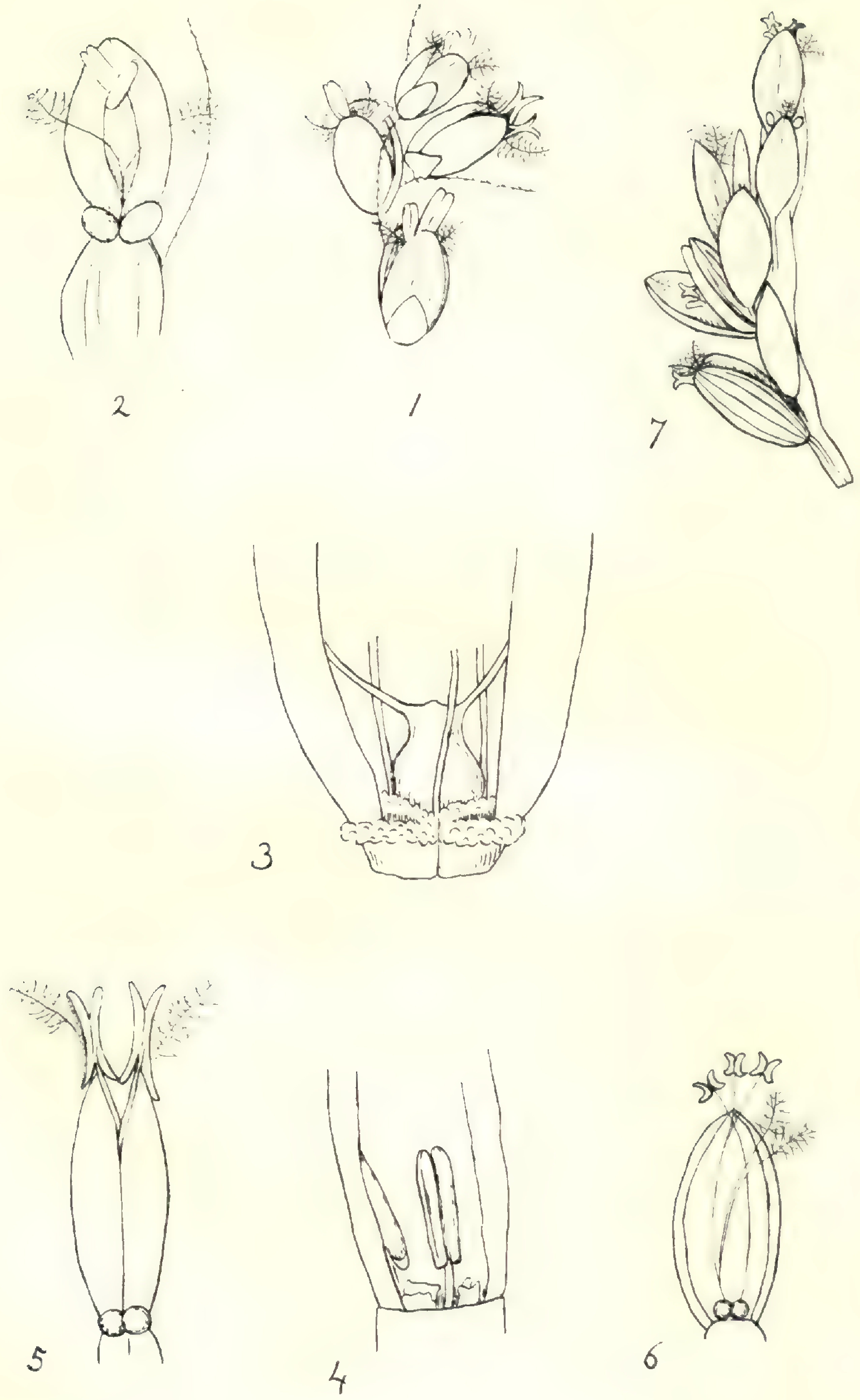
Fraxinus americana L., forma **iodocarpa**, n. f., fructibus purpureis. — Maine: Gardiner, June 13, 1911 (*Jennie M. H. Morrell*). Massachusetts: Winchester, June 17, 1911 (*F. F. Forbes and M. L. Fernald*). — M. L. Fernald, Gray Herbarium.

Volume 14, no. 164, including pages 165 to 176 was issued 23 August, 1912.



C. H. Clarke del.

LODICULES OF GRASSES.



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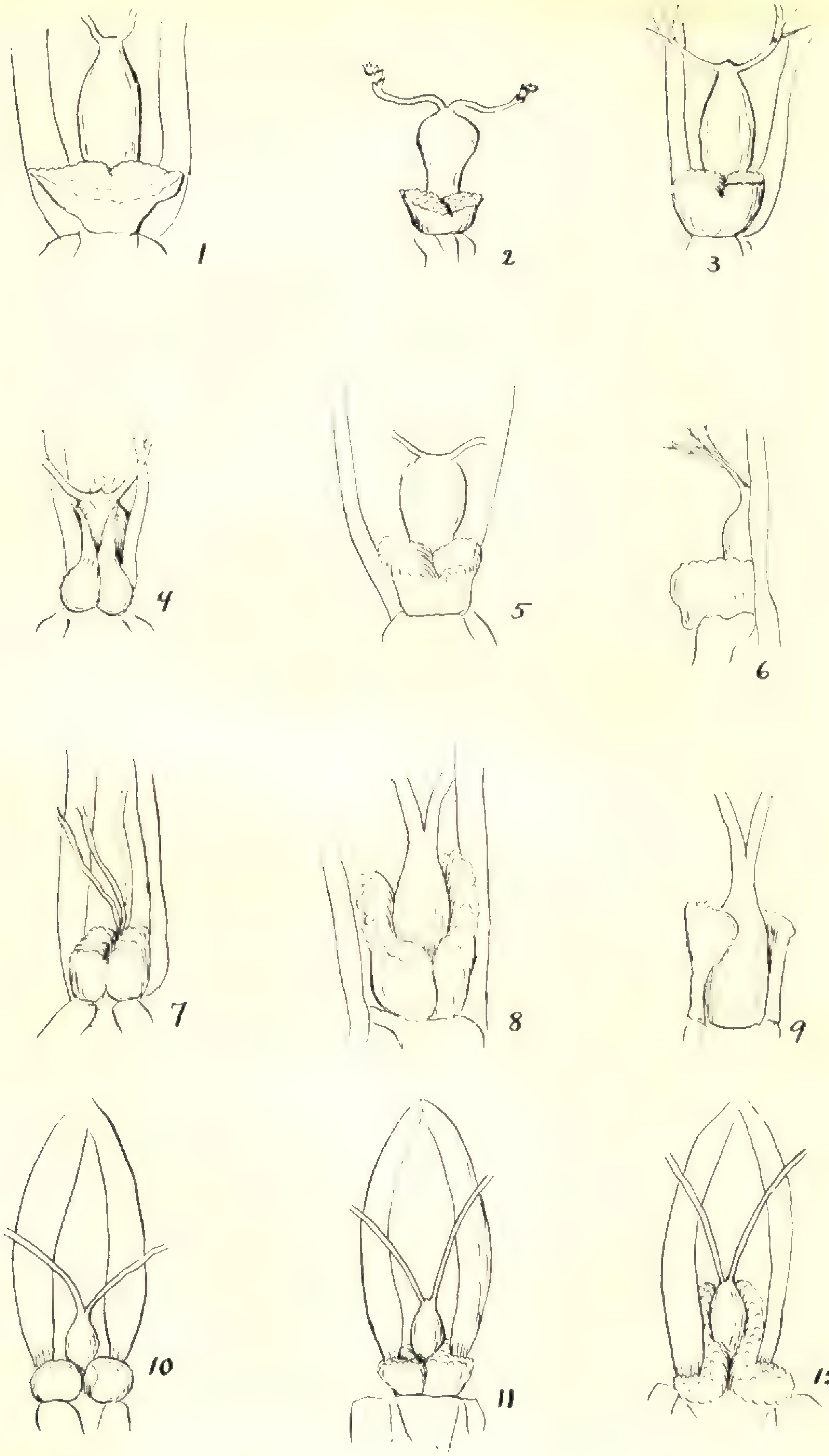

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LODICULES OF GRASSES.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 14. **October, 1912.** **No. 166**

EDITORIAL.

Our journal has now been issued for nearly fourteen years. During this period the necessary expenses of printing and publication have greatly increased and the initial subscription price of one dollar a year is quite inadequate to cover the cost. As no reduction in the cost appears to be possible which would not seriously impair the quality of the journal and as the board of editors and managers feel increasing reluctance to permit recurring deficits to become a burden to the Club, it seems necessary to bring the price of the journal more nearly into accord with the cost. After careful consideration, it has been decided to place the annual subscription price from the beginning of Volume 15 at one dollar and a half, a rate which will be uniform both for the United States and for all foreign countries within the postal union.

A FURTHER NOTE ON EUPHORBIA CYPARISSIAS IN FRUIT.

Walter Deane.

Since I reported (Rhodora, XII, 57–61, 1910) the abundant fruiting of *Euphorbia Cyparissias* L. on the estate of Mr. G. N. McMillan in Shelburne, New Hampshire, three seasons have passed, and I have examined all plants of this species met with, and made careful inquiries wherever possible. The Shelburne station has flourished inordinately, spreading over much more territory and perfecting its seeds in a manner worthy of a better cause. Indeed the case has

become so serious that a portion of the ground, covered by this plant, has been ploughed up, and Alfalfa (*Medicago sativa* L.) planted. I know of no other place where this Euphorbia has so persistently spread to such an extent. The fact that fresh plants appear many rods from established areas seems to indicate clearly that the seeds are responsible for these new colonies, while such colonies rapidly increase by means of the rootstocks in which the plants abound.

I have learned of but two new places where the plants develop fruit, these cases being interesting as showing the abundance of capsules where fruit is formed, while the fact that so few cases have come to my notice would seem to indicate the scarcity of fruiting areas, especially since attention has been previously called to the subject. Mr. W. Herriot of Galt, Ontario, kindly sent me in November, 1911, some fine fruiting specimens of *Euphorbia Cyparissias* L., collected by him in Galt on June 18, 1911. He wrote me several letters during the course of the year in regard to the species from which I will make extracts. On March 12, 1911, he says, "Regarding the fruiting of *Euphorbia Cyparissias* I have known the plant well for over 30 years, it being a common plant in old graveyards especially, but occasional by roadsides where it is very troublesome as a weed, being very difficult to eradicate. As to the fruiting I cannot speak with any certainty previous to 1910, my attention being drawn to its fruiting because I wanted to procure seed for the Department of Agriculture at Ottawa in their making up of extensive seed collections in which they are now engaged. I procured about one pint of seed altogether, and I would say that it fruits quite generally with us." In regard to the season of fruiting Mr. Herriot says under date of December 23, 1911, "Last year I collected the plants in full bloom on May 24, and the specimens I sent to you [in very ripe fruit] were collected June 18 of this year. On June 27 I collected about one half a pint of mature seed." The Shelburne plants were ripe on June 16, and on July 2 were rapidly losing their seeds.

I am indebted to Mr. Robert A. Ware for the other instances of the fruiting of this species. His letter to me, dated from his home, The Warelands, Norfolk, Massachusetts, June 6, 1912, is so full of interesting detail that I venture to quote it in full.

"You asked me for some notes on *Euphorbia Cyparissias* L. in fruit. Since you called attention, a few years ago, to the infrequency with which this plant is reported in fruit, I have examined such colonies of

it as I have chanced upon in Maine, New Hampshire and Massachusetts. In but one place have I found it in fruit, and that was in Greenfield, this state, on June 16, 1910. There I found two stations.

"The first station was on one of the main residential streets when I was walking from my hotel — the Welden — to spend a half day on the near-by elevation known locally as the 'Poet's Seat.' The plants were very numerous over an area of approximately thirty meters square, extending from the grassy street-side up a dilapidated bank-wall and over a part of a lot of grass land, in another part of which was a dwelling. The plants carried an abundance of well developed fruit in such an advanced stage of maturity that on drying there was a strong tendency for the fruit to become detached.

"On my return by a different route, I found on the margin of the settled portion of the city, two other patches close by each other, and distant from the first station a half or three-quarters of a mile. Though the area here was considerably less, the plants were numerous and bore abundant, well developed fruit.

"This year, on May 11th, I revisited the first station. The plants appeared to be as numerous as on my first visit, but were only just coming into flower. The area covered by them was limited on two sides by as many streets, while in another direction it was marked by a line beyond which the grass is kept closely cut as a lawn about the dwelling above referred to. Evidently the grass between the lawn and the street is allowed to mature before it is cut, a period which allows also for the maturity of the spurge.

"As to the persistency of the species in the face of a determined effort to eradicate it, I cannot speak from wide experience, but my belief is that it is not difficult to get rid of it if one wishes to do so. And for this reason: — when, some fifteen years ago, we first took possession of this place, I found, on one part of the house grounds, a tangle of low blackberry vines, grass and this Euphorbia. It seemed to me then a discouraging task to get them out of the way. But by frequent cutting I soon found that the undesired plants were willing to give up the struggle, and I have had no trouble from them since. Just beyond the limits of my cutting, however, they are holding their own with unabated vigor.

"As the first house here was built by my ancestors in the latter part of the seventeenth century, it is likely that the plants have been long in possession of certain places where they still persist. Ever since we have been here I have looked for fruit, but have never seen it here."

A specimen of the Greenfield Euphorbia in fruit is in my herbarium. There are now on record four American stations where *Euphorbia Cyparissias* has been found in fruit, Shelburne, New Hampshire, Greenfield, Massachusetts, Staten Island, New York, and Galt, Ontario. I shall continue to seek information in regard to the fruiting status of this species, and I trust that any new cases will be called to my attention.

Cambridge, Massachusetts.

THE SAND PLUM IN INDIANA.

E. J. Hill.

During the summer of 1906 I discovered a *Prunus* which differed from any heretofore seen in the region about Chicago. It was growing in the sand just without the right of way of the Lake Shore and Michigan Southern Railroad, near Dune Park, Lake County, Indiana. The nearness to the railroad and the striking difference between its leaves and those of *Prunus Americana,* the common wild plum of this region, led me to conclude that it was an introduction. It was mainly represented by bushy branched shrubs, 1–3 m. high, which were quite thorny, or provided with short, spinescent branches. They formed two narrow thickets, each extending for several rods beside the fence which separated them from the railroad. They were examined the next spring for flowers, but too late for petals. No fruit set that year. In the spring of 1908 good flowers were obtained May 2nd, about two weeks earlier than the time of visiting them the year before. No fruit was borne that year. Enough had been disclosed by the flowers to make it evident that, if perfected, the fruit would be a plum. But, from the character of the leaves and flowers, and the habit of the shrub, I had concluded it was the sand plum, *P. Watsoni* Sarg., or if not specifically distinct, *P. angustifolia* Marsh., var. *Watsoni* (Sarg.) Waugh, introduced here from the western plains. Since it freely spreads by long roots running just below the surface of the ground, sending up new shoots or suckers at the distance of 4 or 5 m from the

parent stem in some cases, it seemed well equipped for propagation even if lacking fruit. But it has been examined every season for fruit, though not for flowers, without avail till the present. This year (1912) it was abundant, the greater part of the mature shrubs being in bearing. It varied somewhat in size and shape, but no more than is seen in the fruit of *P. Americana.* The season lasts three or four weeks, beginning about the middle of July. The plums are bright red, without bloom, globose, 7–10 mm. in diameter, or larger and slightly lengthened on some shrubs. The skin is firm but not thick, flesh yellow and pleasantly acid, stone ovoid to oval, rather large and thick, the surface rugose. It was apparently an improvement on the sand-plum of the west, approaching the Chickasaw plum. In a climate with a greater and more evenly distributed rainfall, changes for the better might be expected. There were a few cases in which the shrubs were more tree-like in form, reaching a height of four meters, but the mass of them was low, the trunks 3–10 dm. high. The points in which it approaches *P. angustifolia* may be an argument in favor of its varietal character.

To account for the plums I had gone back to the time when I had noticed manure spread on both sides of the railway track through the dune region. From its appearance it evidently came from the stock-yards of Chicago or from stock cars. It was apparently done to encourage the growth of some covering for the sand. This was about 1890. It is not uncommon to find western plants springing up in the dump from stock cars, some of them persisting and becoming members of our flora. It seemed altogether probable that the plum had been introduced then, spread beyond the fence, and though destroyed within the enclosure by continual cutting, had held on outside. My conjecture was unexpectedly corroborated the day the fruit was found. Seeing some trackmen at work close by I asked their overseer if he had lived in the vicinity for a number of years. Learning that he had I questioned him about the plums. He said that manure from the stockyards had been spread beside the track about twenty years before, and the plums came up just after. As I had given him no hint of my conjecture, this proved strong evidence in its favor. His knowledge of the character of the plum and of previous fruiting was shown by a further statement that he had transferred some to his yard but did not think them worth cultivating, they were so low and bushy and the stone was large in proportion to the flesh.

That this *Prunus* came from the west rather than from the south is most probable both from the general movement of stock for the Chicago market and from the hardiness of the shrub. If we refer it to the Chickasaw plum, we find the range of this considerably south of this latitude. It comes into the extreme southern part of Illinois, being credited to Union county by Vasey, and into the corresponding part of Indiana, being credited to Gibson county by Schneck. Both of these stations are near the Ohio river. In his catalogue of the flowering plants and ferns of Indiana, Stanley Coulter says under *P. angustifolia:* "Of rare occurrence in the southwestern counties of the state. It is reported as growing on dry, rather rocky slopes. I have seen no specimens and the species is admitted on the authority of collectors."[1] Schneck for Gibson county is the only person cited. It is not given among the trees of Indiana by Chas. C. Deam in the Eleventh annual Report of the State Board of Forestry of Indiana (1911.)

It does not seem to be hardy as far north as the south end of Lake Michigan or probably any farther north than the localities mentioned for these two states. Sargent says of it, "In eastern New England it is barely hardy, seldom flowering and never producing fruit."[2] But the *Prunus* at Dune Park appears as hardy as any indigenous member of our flora. All the circumstances tend to the conviction that it was introduced from the western plains, and that its apparently improved condition is due to a better environment than in its native region.

CHICAGO, ILLINOIS.

[1] Report of the State Geologist, 1901, p. 794.
[2] The Silva of North America 4: 26, 1892.

GALIUM LABRADORICUM IN PENNSYLVANIA.

BAYARD LONG.

IN the summer of 1910 it was my fortune to make the acquaintance of *Galium labradoricum* Wiegand in its native bogs along the lower St. Lawrence in the Province of Quebec, Canada. Among the host of interesting plants new to me, this humble little bed-straw, for some reason, was always of particular interest whenever it was found at a new locality. Doubtless its comparatively late recognition and its perfect distinctness from allies which at one time were a fertile source of considerable confusion, made it a pleasing species to know in the field.

When, during the following winter, in examining and identifying some local collections of Mr. Harold W. Pretz of Allentown, Pennsylvania, I came upon several sheets of this same little *Galium*, I naturally at once wrote him for more data and information regarding its occurrence, since to the best of my knowledge the species had not been known south of west-central New York [1] and northwestern Connecticut.[2]

I learned that Mr. Pretz's plants had come from Monroe County, Pennsylvania, in the vicinity of Saylorsburg. Through his kindness, I was enabled on August 6, 1911, to visit the locality with him. Mr. Pretz's original collection was on June 13, 1909, when the plant was found in good flower, but this second time in 1911 we were not so fortunate: the flowering-season was past and even good fruit was rare.

The locality lies in the terminal-moraine region just north of the main ridge of the Blue Mountains, between Wind Gap and Saylorsburg. There is a line of bogs here near the head of Aquashicola [3] Creek, supporting species like *Salix candida* and *Lobelia Kalmii*, plants which ordinarily find the southern limit of their range within

[1] Wiegand, RHODORA, vi. 21 (1904); Haberer, RHODORA, vii. 109 (1905).

[2] Bissell, RHODORA, v. 33 (1903).

[3] The United States Official Postal Guide has been followed in the spelling of this name, since there would seem to be no logical reason why the name of the creek should be spelled differently from that of the village, and since considerable discrepancy was found to occur upon the various maps consulted. The spelling used in the Second Geological Survey of Pennsylvania (G [6]. p 29) and in J. L. Smith's Topographical, Township and Railroad Map of Pennsylvania is Aquanchicola.

or near the glaciated region of Pennsylvania. Here, associated often with *Galium tinctorium* (but perfectly distinct and showing little if any striking resemblance) and more rarely with *G. Claytoni*, was found in great abundance the object of our search. It was seen in two bogs, in the larger of which it at times formed a considerable portion of the low vegetation.

Prof. Karl M. Wiegand very kindly examined material sent to the Gray Herbarium, and verified the identification. A full suite of specimens (showing diversity of habit assumed, depending upon the character of the associated vegetation) will be deposited in the Herbarium of the Academy of Natural Sciences of Philadelphia. Material of the original collection is also in the herbarium of Mr. Pretz at Allentown.

Doubtless the plant will be found in similar bogs in the higher Alleghenies or in other localities on the Pocono Plateau, when these areas have been more systematically explored. There are bogs in Northampton County, south of the Blue Mountains (but within the terminal-moraine region), which are very similar in character to those on Aquashicola Creek and support many of the same species. These bogs have been pretty thoroughly explored but it would not be surprising if the *Galium* should be discovered there. Another very possible locality is the area of glaciated bogs in northern New Jersey.

All of these areas, originally suggested to my mind by the occurrence there of similar bogs and associated species, strikingly agree in general with the remark of Prof. Wiegand that *Galium labradoricum* in the Pocono of Pennsylvania would show a distribution like that of *Amelanchier Bartramiana*, which reaches its southern limit in the mountain regions of eastern Pennsylvania — in the Alleghenies, the Poconos, and the Blue Mountains. The general distribution of either of the two above species might be briefly written: Eastern Pennsylvania and the region around the western portion of Lake Superior northward to Labrador.

Academy of Natural Sciences, Philadelphia.

TILLAEA IN NANTUCKET.

MARIA L. OWEN.

IN 1841, William Oakes reported *Tillaea simplex* Nutt. amongst other plants found in 1829 in Nantucket. (Hovey's Magazine of Horticulture and Botany, Vol. VII. p. 182.) This name now gives place to the earlier *T. aquatica* L., while at least a part of the specimens of *Tillaea* from Nantucket show the stalked flowers and fruit as in *T. Vaillantii* Willd. We cannot doubt that Mr. Oakes collected a *Tillaea* in 1829 and that no more of it was found till 1894. It is the circumstances of this late find which I wish to record and its second disappearance from that year up to the present time. Its correct name, whether *T. aquatica* L., *T. Vaillantii* Willd., or even some different one cannot be settled until we catch the elusive little plant again. Mr. Oakes stated that he collected it "on the dried borders of small ponds" on the island, and in my collecting days I used to hope to come across it, and I have mentioned it to botanists visiting Nantucket, as something to look for.

From about 1890 on, Mrs. Mabel P. Robinson with her family spent several consecutive summers on the island; she was a diligent collector and student of its flora, and I made my usual recommendation to her. This time not in vain!

I was living in Springfield then, and with the specimen which Mrs. Robinson sent me there, she wrote that she had come home from one of her long walks with her box full of plants, and had analyzed most of them and decided on their names when she took up this little thing, in poor condition for it was then a day or two old. It was, indeed, so far gone that after some study she gave it up and was just going to throw it away, when what I had told her of *Tillaea* flashed into her mind. She took up the specimen again and was quickly convinced that the long-sought rarity was hers — *Tillaea* had come out of its seclusion of sixty-five years!

This was in August, 1894. In 1896, the first time after that that we were on the island together I invited Mrs. Robinson to drive out to Hummock Pond with me and show me the *Tillaea* locality. We went along the east shore and stopped near the southern limit of the pines; there Mrs. Robinson left me to hunt up the spot, but soon came back

and taking me to the edge of a bank pointed down to what looked to me like a large patch (perhaps twelve feet by six) of *Myriophyllum tenellum* Big. such as I often used to see by the ponds amongst the hills between Almanac Pond and Sankaty Head — "Could any of that growth have been *Tillaea?*" was my quick question. I went out soon afterwards to investigate thoroughly, but my previous visits there were made some fifty years before, and I now found, to my sorrow, the low shores of these ponds invaded by a sturdy growth of cattails which has probably completely filled the water by this time.

I return to Hummock. This bank was some ten or twelve feet high. We went down — it was very wet below, although at a considerable distance from the pond edge — and found the bright green sod composed of "very small tufted plants an inch or two high, rooting at the base," just as the Manual says, but the numerous flowers of a purer white than I expected to see. The well-formed fruit in all stages was as abundant as the flowers and made the specimens complete and perfect, all that could be desired for the herbarium. I cut out sods for my botanical friends, but the late Mr. L. L. Dame who was at his summer home in Siasconset was the only one who could have received the plant in all its freshness. The last time I saw him, the year before he died, I asked him if he remembered it, "Perfectly" he replied. "The pretty little flowers that starred the sod, and the fine fruit?" "Perfectly" was again the reply. No human being has, to my knowledge seen the patch again. I have looked for it myself a number of times in company with keen and quick-eyed searchers to whom I have described what I wanted, but we never found it.

In 1902 Mrs. Robinson went out with me again; she not only could not find the spot but she seemed to have forgotten it and the plant too. She took me to the edge of the water and after search amongst the floating weeds drew out what she said was *Tillaea.* I was amazed, but I later found that it is so called by other botanists.

Tillaea simplex Nutt. is described in every edition of Gray's Manual, in Gray's Field, Forest and Garden Botany and in Wood's Class-book, and always as a low tufted plant with white flowers rooting in the mud. Oakes found it rooting in the mud. Now these three botanists surely never knew of the aquatic form which differs from their plant in many striking particulars. It grows in shallow water, though sometimes two feet deep, rooting at the bottom, but reaching up to the surface; it is apt to break off and then, entangled with other water

growths, is washed ashore by the ripple of the wind-stirred waves. When drawn out of the water it hangs limp from the stick, a pale olive-colored mass; no flower or fruit visible to the naked eye. The land form is beautiful, but this — vegetation can hardly be more unlovely. The land form answers, point by point, Dr. Gray's description in every edition of his Manual, while this differs point by point.

But my concern is to find my lost station and to rediscover Oakes's locality, for which our only guide is his statement that it was "the dried-up edge of small ponds." Now he never would have called Hummock, two miles long, a small pond; besides, that accurate botanist used the plural number — he found it in more than one spot. Along the south coast of the island there is a row of shallow ponds, one or two about half a mile long, the others of varying smaller size. Some of them are entirely dry now, though they keep their place on the map, but in 1829 they probably all had water in their beds. Now to give a guess at Mr. Oakes's walks, I should say that his collector's instinct would have led him speedily to the "Head of Hummock" which is not far from town, and, finding the vegetation rich there, he would have kept along the east shore of the pond, and as he got towards the southern end, he would have seen Reedy Pond and from that have been lured along first to Great Mioxes and then to Little Mioxes. These answer his description; they are small, and might be partly dried up at any time, that condition depending on the character of the season for much or little rain. Miacomet, a pond about a mile long, is about as far from town, but if he walked out to that and went down its east side, he might naturally have turned from its lower end along the south shore of the island and have come to Weeweeder, a small pond, and the first of the row just mentioned. They follow, one after another, at such short distances, that he would have been likely to keep on till he had searched them all. These are Nobadeer, Madequecham, Toopcha and Forked, and to my mind, these after the three before mentioned, are the most likely places on the whole island. Moreover, these are the only ponds that I ever knew, which answered Mr. Oakes's description of his locality. The aquatic form is certainly not what Oakes found, and it was doubtless as unknown to him as it was to Dr. Gray after him, so his station is still undiscovered, and mine is lost for the present. But I solemnly advise collectors to keep away from these ponds from Reedy to the Forked Ponds. The life savers who patrol the coast report that recently quicksands have been

discovered near Reedy Pond and the Mioxes so dangerous that they will not bear up the weight of a small dog. Of course they may develop at any time on the edge of the others; the only safe course is to keep away from all. But to console those who long to explore them I will say that Oakes's stations will probably never be seen again — the physical changes of eighty-three years have obliterated them. My patch however doubtless still exists, and there is a happy day in store for any botanist who sees it at just the right season — that bright green sod starred profusely with the small but conspicuous white flowers.

Manhasset, Long Island.

The Seventeenth Annual Field Meeting of the Vermont Botanical Club was held at Franklin, conjointly with the Vermont Bird Club, on Thursday and Friday, July 25 and 26. Head quarters were at the Franklin House and about thirty members of both clubs attended. A short business meeting was held the evening before, in the public library of Franklin. The forenoon of Thursday was spent in exploring a sphagnum bog in which besides the plants usual to such a habitat the rare white fringed orchid, *Habenaria blephariglottis* (Willd.) Torr. was found, also the bladderwort, *Utricularia cornuta* Michx. Next day another sphagnum bog was visited about five miles from Franklin and lying in the three towns of Franklin, Berkshire, and Enosburgh. Here the white fringed orchid was abundant and several other bog orchids were found. Some hybrids of *Rumex* were seen by the roadside. *Scirpus Peckii* Britton was found in a low meadow and the European *Malva Alcea* L., var. *fastigiata* was abundant at several roadside stations in the vicinity. At North Sheldon, *Linaria minor* (L.) Desf. and a very dwarf form of *Silene noctiflora* L. were observed, growing abundantly between the railway tracks. About a half a dozen new members were added to the Club and the meeting will be remembered with pleasure by all who were present. The winter meeting will be held at St. Johnsbury in January, 1913.— Nellie F. Flynn, Burlington, Vermont.

A NEW STATION FOR RUBUS IDAEUS, VAR. ANOMALUS.— It may be of interest to readers of RHODORA to know that upon May 19th, of the present season I found a single plant of *Rubus idaeus* L. var. *anomalus* Arrhenius, in Townshend, Vermont, growing upon a rocky hillside. The ridge upon which the plant was growing, while not especially limey, is somewhat so, enough so that it has been quarried at some little distance from the station, in former years.

Determination was by Prof. Fernald. The plant had two good fruiting canes, one of which was sent to the herbarium of the New England Botanical Club and the other retained in my private herbarium.— LESTON A. WHEELER, Townshend, Vermont.

A CONNECTICUT STATION FOR ILEX MOLLIS.— Mr. W. E. Campbell of New Haven has recently found a plant of this species growing in the woods on the estate of Mr. T. W. Bryant at Torrington, Connecticut. Regarding the plant Mr. Bryant writes,— "This shrub has grown in a thicket of undergrowth and was saved by me in cutting the underbrush. I know of six separate clumps. The largest has a parent root about six inches in diameter out of which grow six branches, the largest of which is about twelve feet high. This is evidently an old plant and is completely covered with berries. The other clumps are small and I should judge young, and only one or two of them have any berries at all." This discovery is interesting for this is the first time, I believe, that this species has been found in New England or nearer New England than the Catskill Mountains.— C. S. SARGENT, Arnold Arboretum.

[The Torrington station is apparently the second in New England. In RHODORA, vi. 204, Mr. Ralph Hoffmann recorded a station found by him in June, 1902, on the western side of the Dome in Berkshire County, Massachusetts, where the *Ilex* was "growing commonly in the shade in the moist woodland." Several sheets of material from the Dome are preserved in the herbarium of the New England Botanical Club.— Eds.]

GALIUM TRIFIDUM AT WELLESLEY, MASSACHUSETTS.— Last September, while canoeing on Lake Waban, Wellesley, I found, growing

in a wet marshy place on the edge of the lake, a small quantity of *Galium trifidum* L. In the seventh edition of Gray's Manual the southern range of this species is given as "south to northern and western New England." The only record of the species from Massachusetts in the herbarium of the New England Botanical Club is from Berkshire County. The material from Lake Waban was identified for me by Prof. Wiegand.— F. W. Hunnewell 2d, Wellesley, Massachusetts.

An Occurrence of Nicotiana rustica in Massachusetts.— While beating up the "Peat meadow" section of Worcester, Massachusetts, for late-blooming plants on October 6th the writer came unexpectedly across a fine station of the Wild Tobacco (*Nicotiana rustica* L.). The flowering period had passed, and the plants were in full fruit. A specimen, forwarded to the Gray Herbarium by Mrs. E. L. Horr, was there identified, with the comment that the occurrence of this species in the New England states has not been very definitely recorded except in Connecticut and that the station in Worcester had better be put on published record.

The colony here observed consisted of five plants, two being close together, a third about six feet away, and two more (some four feet apart) at a distance of some twenty yards. The three plants near together, were in poor soil, mixed with broken bricks, ashes, and other dumping-ground refuse, while the further group was in a small patch of grassland. Within ten yards of the first group was a solitary stalk of *Hibiscus Trionum* with one open flower, one inflated fruiting calyx, and two unopened buds. At a distance of about fifty yards from the group were two fine plants of *Abutilon Theophrasti*. Other plants in the vicinity were *Arctium minus*, several species of *Chenopodium*, a single stalk of *Helianthus annuus, Sambucus canadensis, Typha latifolia, Eupatorium purpureum*, var. *maculatum*, etc.

While one of the main thoroughfares of the city passes within two hundred yards of the stand of the Tobacco, the surrounding soil is of a peaty character and the peat-bog comes close to the spot. Between the Tobacco and the street, however, the land has been filled in and

graded for building purposes, to some extent; but none of it has ever been under cultivation.— Norman P. Woodward, Worcester, Massachusetts.

A seedless Barberry found at Sherborn, Massachusetts.— At the request of the editor, it gives me pleasure to send Rhodora some notes upon a seedless Barberry, which I recently sent to the Gray Herbarium, where it was identified as *Berberis vulgaris*, var. *asperma*. The shrub has been known here for about forty years, but its characteristic feature was not found out until four or five years ago, when it was discovered by chance. The shrub stands in partial shade on sloping ground in a dry, rocky field, which was formerly an open pasture but is now rapidly growing up to pitch pines, junipers, blueberries, etc. Behind it is a thick stand of second growth woods, the original trees having been cut about thirty-five years ago. There are other barberries in the field, but all are typical *B. vulgaris*. So far as known the land has never been cultivated, and the plant appears to be thoroughly wild. It was brought to my notice in the autumn of 1911 by the discoverer of its seedless character, who not being a botanist did not appreciate the scientific interest of the discovery. The plant bore little fruit then, though it was large and apparently thrifty, and I was able to collect only a poor specimen, which was deposited in the herbarium of the Boston Society of Natural History, No. 713 of the Flora of Sherborn, Massachusetts. This year, however, I have been able to get good flowering and fruiting material, specimens of which I have placed in the Gray Herbarium and with the Boston Society of Natural History, Nos. 713a and 713b.— Martha Louise Loomis, Sherborn, Massachusetts.

An American Station for Illecebrum verticillatum.— Among some plants recently identified for me at the Gray Herbarium was a specimen of *Illecebrum verticillatum* L., a species somewhat widely distributed in Europe and northern Africa, but apparently not hitherto recorded from America. I found it on land formerly occupied by the Reading Nursery, at Reading, Massachusetts. This nursery lot was

abandoned several years ago and since then has not been cultivated. The ground is everywhere covered with plants of various kinds, with an occasional exotic cropping out among the native ones. The Illecebrum was probably accidentally introduced some years ago on some foreign nursery stock. It has now become quite established and covers the ground thickly over a considerable area.— C. C. Kingman, Reading, Massachusetts.

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NOTES ON NEW ENGLAND HEPATICAE,— X.

Alexander W. Evans.

The genus *Chiloscyphus* is represented in Europe and North America by a number of distinct forms, some of which are terrestrial while others are aquatic or subaquatic in habit. A new impetus to study these forms has been given by the publication of Schiffner's "Kritik der europäischen Formen der Gattung *Chiloscyphus* auf phylogenetischer Grundlage." [1] In this paper six species are recognized, three being terrestrial and three aquatic. The terrestrial species include *Ch. pallescens, Ch. polyanthus,* and *Ch. ascendens,* while the aquatic species include *Ch. fragilis, Ch. rivularis,* and *Ch. Nordstedtii.* With the exception of the last these species are all definitely known from North America. Schiffner's interpretation differs in certain respects from that given by K. Müller in his "Lebermoose Deutschlands, Oesterreichs und der Schweiz." [2] According to his conclusions *Ch. pallescens, Ch. polyanthus, Ch. ascendens,* and *Ch. Nordstedtii* represent elementary species, or "kleine Arten"; *Ch. fragilis* and *Ch. rivularis,* on the other hand, are nothing more than inconstant varieties of *Ch. polyanthus.* Müller's position is upheld by Macvicar,[3] who includes both these aquatic forms under *Ch. polyanthus* as varieties and yet admits *Ch. pallescens* as a species. *Ch. ascendens* and *Ch. Nordstedtii,* not having been reported from the British Isles, are not considered by this author. In the opinion of the writer Schiffner's segregation of *Ch. fragilis* and *Ch. rivularis* seems warranted, in view of the evidence at hand and of the prevalent tendency to recognize "kleine Arten."

[1] Beih. zum Bot. Centralbl. **29**²: 74–116. *pl. 1, 2.* 1912.
[2] Rabenhorst's Kryptogamen-Flora **6**: 822–826. 1911.
[3] Student's Handb. of British Hepatics 240, 241. 1912.

At the same time it must be admitted that culture experiments in the future may necessitate different interpretations. With regard to *Ch. ascendens* the evidence is less convincing; the diagnostic characters separating it from *Ch. pallescens* are both vague and inconstant, and the writer is still inclined to deny it recognition as a species. In any case the discussion given below of these three plants, all of which are widely distributed in eastern North America, may prove of interest. The present paper records also several Hepaticae which are new to New England, the most noteworthy of which is perhaps the rare northern species *Neesiella pilosa.* In conclusion several additions to local state floras are reported.

1. Neesiella pilosa (Hornem.) Schiffn. Hedwigia **47**: 314. 1908. On a ledge at base of cliff. Willoughby Mountain, Willoughby, Vermont (*F. G. Floyd*, 1898). New to New England, but recently reported from Bic, Quebec (*J. F. Collins*) and previously known in North America from Greenland. The range of the species extends across northern Europe into Siberia. The characteristics of this interesting plant were given by the writer in the Bryologist for September, 1911, so that it is unnecessary to repeat them here. The Vermont specimens are very fragmentary. A single carpocephalum with a weathered thallus was received from W. G. Farlow several years ago, but although its reference to *N. pilosa* seemed probable, it was considered unwise to base a definite record upon it. Fortunately more complete material, obtained from the herbarium of G. G. Kennedy, has since been received from Miss Lorenz.

2. Lophozia Hatcheri (Evans) Steph. Bull. de l'Herb. Boissier II. **2**: 159. 1902. *Jungermannia Hatcheri* Evans, Bull. Torrey Club **25**: 417. *pl. 346, f. 1–7.* 1898. *Lophozia Baueriana* Schiffn. Lotos **51**: (9). 1903. *Barbilophozia Hatcheri* Loeske, Verhandl. Bot. Ver. Prov. Brandenburg **49**: 37. 1907. The writer has already noted this species, under the name *L. Baueriana,* from a single New England locality, namely: Little Saddleback Mountain, Franklin County, Maine (*Chamberlain & Knowlton*).[1] No other New England stations can as yet be reported, but Conklin has recently shown that the species has a wide range in North America, extending from Quebec to British Columbia and California.[2] The synonymy given above is now pretty

[1] Rhodora **10**: 188. 1908. A few additional synonyms may be found here.
[2] Bryologist **15**: 12. 1912.

widely accepted in Europe, in spite of the fact that *L. Hatcheri* is an antarctic species, while *L. Baueriana* is northern in its distribution, no intermediate stations for the plant being known. The first suggestion that the two species were synonymous is due to Loeske.

3. Lophozia heterocolpa (Thed.) M. A. Howe, Mem. Torrey Club **7**: 108. 1899.[1] On a wet rock containing magnesium. Round Mountain, Franklin County, Maine (*Miss Lorenz*, 1912). Widely distributed in Europe and northern Asia. The range in North America is still incompletely known, but the species has already been reported from Greenland, Ellesmere Land, Yukon, Alaska, Ontario, Wisconsin, Minnesota, British Columbia, and California. *L. heterocolpa* belongs to a group of closely related species, of which *L. Muelleri* (Nees) Dumort. is usually regarded as the type. This group has recently been defined by K. Müller as a subgenus of *Lophozia*, under the name *Leiocolea*.[2] At the present time only two other members of this subgenus, *L. badensis* (Gottsche) Schiffn. and *L. Kaurini* (Limpr.) Steph., are definitely known from New England,[3] although others are surely to be expected. The occurrence of gemmae, borne on upright shoots with differentiated leaves, will serve to distinguish *L. heterocolpa* from most of its allies. The gemmiparous shoots bear some resemblance to those of *L. attenuata* (Mart.) Dumort., a member of the subgenus *Barbilophozia*, the modified leaves being erect and more or less appressed to the stem. These leaves, however, which are in three ranks, are definitely bilobed with dentate or lacerate margins, while the gemmae themselves are ellipsoid bodies. In *L. attenuata* the gemmiparous leaves are in only two ranks, they are truncate at the apex and shortly but irregularly two- or three-lobed, and the gemmae are more or less angular. In the subgenus *Leiocolea* the only other species in which gemmae have been described is *Lophozia harpanthoides* Bryhn & Kaalaas,[4] known from Ellesmere Land, Greenland, and King Oscar Land. In this arctic plant the leaf-cells are a little smaller than in *L. heterocolpa*, although their trigones are better developed. The gemmae also are said to differ in their subreniform outline and purple color, those of *L. heterocolpa* being usually constricted in the middle and reddish brown. Aside from the absence

[1] A full synonymy may be found here.
[2] Rabenhorst's Kryptogamen-Flora **6**: 711. 1910.
[3] See Evans, Rhodora **12**: 197, 198. 1910.
[4] Rep. Second Norwegian Arctic Exped. in the "Fram" **11**: 31. 1906.

of gemmae *L. Muelleri* can be distinguished from *L. heterocolpa* by the sharper lobes of the leaves, by the slightly larger leaf-cells, and by the smaller trigones. In most other respects the two species are very much alike and have often been confused.

4. Lophozia obtusa (Lindb.) Evans, Proc. Wash. Acad. **2**: 303. 1899. *Jungermannia obtusa* Lindb. Musc. Scand. 7. 1879. On a shaded bank, mixed with mosses. Round Mountain, Franklin County, Maine (*Miss Lorenz*, 1912). The third North American station for the species, the other two being at much higher latitudes, in Alaska and Ellesmere Land, respectively. The plant is widely distributed in Europe but is nowhere abundant. It has not yet been reported from Asia. Since *L. obtusa* is figured and fully described in the recent manuals of K. Müller and Macvicar, only its most striking peculiarities need be mentioned here. The plants rarely grow in pure mats but usually straggle through tufts of other bryophytes. They vary in color from yellowish to dark green and bear a superficial resemblance, as Müller has pointed out, to the much commoner *L. barbata* (Schmid.) Dumort. The leaves, however, will at once separate the species. Instead of being four-lobed, as is usual in *L. barbata*, they are almost invariably only two-lobed, and the lobes are further characterized by being rounded or very obtuse at the apex. In most cases the postical lobe is a little larger than the antical, and there is a tendency on slender stems for the lobes to be somewhat sharper than is normal. Fortunately robust stems with the lobes in typical condition are usually present. The underleaves are very rudimentary and cannot easily be demonstrated. This peculiarity, the absence of specialized gemmiparous shoots, and the larger size will at once distinguish *L. obtusa* from *L. heterocolpa*, in which also the lobes are normally blunt. In spite of its bilobed leaves *L. obtusa* apparently belongs in the subgenus *Barbilophozia* and is placed there both by Müller and by Macvicar. The Maine specimens of *L. obtusa* and of *L. heterocolpa* were determined by Miss Lorenz, who has kindly supplied the writer with illustrative material.

5. Chiloscyphus ascendens (Hook. & Wils.) Sulliv.; Gray's Manual, Ed. I. 691. 1848. *Jungermannia ascendens* Hook. & Wils.; Drummond, Musc. Amer. St. Merid. *165*. 1841. The original material of this supposed species was collected by Drummond at St. Louis, Missouri, and distributed, as indicated above, in his second series of exsiccatae. Soon afterwards Sullivant detected it at Colum-

bus, Ohio, and before long it was found to have a wide distribution in the United States and Canada. In distinguishing *Ch. ascendens* Sullivant laid most stress on the long and irregularly lacerate-toothed lobes of the perianth, those of the allied *Ch. polyanthus* being short and nearly entire. His figure [1] does not show these lobes very clearly but brings out the fact that the calyptra is enclosed by the perianth even after the capsule has been extruded. In *Ch. polyanthus,* as European writers have always insisted, the calyptra projects beyond the perianth at maturity. Although *Ch. polyanthus* was the only species with which Sullivant definitely compared *Ch. ascendens,* Nees von Esenbeck [2] had already recognized two species which might well have been considered in connection with it. These were *Ch. pallescens* (Ehrh.) Dumort. and *Ch. lophocoleoides* Nees, the latter proposed as a new species. In *Ch. pallescens* the calyptra was said to be frequently exserted, while in *Ch. lophocoleoides* it was said to remain hidden within the perianth. *Ch. lophocoleoides* never received much recognition as a species and at the present time is regarded by most writers as a form or poorly characterized variety of *Ch. pallescens.* This implies of course that the perianth of *Ch. pallescens* is subject to considerable variation in length, being sometimes shorter than the calyptra and sometimes longer, and the natural inference would be that *Ch. ascendens* was even more closely related to *Ch. pallescens* than to *Ch. polyanthus.* About eight years ago the writer [3] called attention to this close relationship and showed further that no constant differential characters could be drawn from the underleaves, as certain writers had attempted to do. It was therefore suggested that *Ch. ascendens* should be regarded as a simple synonym of *Ch. pallescens.*

Since this time, however, Stephani,[4] as well as K. Müller and Schiffner, has accepted *Ch. ascendens* as a valid species, distinct from *Ch. pallescens,* although Schiffner is careful to designate it as a "kleine Art," closely related to both *Ch. pallescens* and *Ch. polyanthus* and to a certain extent intermediate between them. According to Schiffner's statements it differs from *Ch. pallescens* not only in its larger perianth but also in its smaller leaf-cells, the latter approaching in size those of *Ch. polyanthus.* At the same time he admits that the leaf-cells in

[1] Gray's Manual Ed. II. *pl. 7.* 1856.
[2] Naturgeschichte der europ. Lebermoose **2**: 364. 1836.
[3] Rhodora **7**: 54. 1905.
[4] Bull. de l'Herb. Boissier II. **8**: 144. 1908.

Ch. pallescens are subject to more or less variation, being sometimes no larger than in *Ch. polyanthus*, and he intimates that some of the European forms which have been included under *Ch. pallescens* and which have perianths equalling the calyptra in length ought perhaps to be referred to *Ch. ascendens* rather than to *Ch. pallescens*. He further confirms the statement of K. Müller that the Siberian variety *grandicalyx* Lindb. & Arnell,[1] included by its authors under *Ch. polyanthus*, really represents *Ch. ascendens*, so that the known range of the plant is northern North America and Asia with a possible extension into Europe.

Although Schiffner separates *Ch. ascendens* from its allies on the basis of two differences only, Stephani and K. Müller find further differential characters in the male inflorescence. According to Stephani the androecia form slender branches arising from the stem, the bracts being small and saccate with an obtuse antical lobule. K. Müller describes male branches of the same type, adding that they arise in the axils of the underleaves and that they can easily be overlooked on account of their minute size. According to him the bracts are ovate with a lunulate sinus and a basal inflexed lobe which encloses a single antheridium. He also states that antheridia are often borne at the bases of leaves on normal branches, a type of inflorescence characteristic of *Ch. polyanthus*, *Ch. pallescens*, and the other members of the genus *Chiloscyphus*, as recently restricted by Schiffner.[1] On the basis of these observations Müller concludes that *Ch. ascendens* is a connecting link between the restricted *Chiloscyphus* and *Heteroscyphus*,[2] a genus segregated by Schiffner from the comprehensive genus *Chiloscyphus*, as defined by the older writers. In *Heteroscyphus*, which is made up largely of tropical and antarctic species, the male branches are invariably small and specialized. Schiffner hesitates to accept the descriptions of the androecia as given by Stephani and Müller and states that he has never found a male inflorescence in *Ch. ascendens* which differs from the normal *Chiloscyphus* type. He therefore refuses to admit that *Ch. ascendens* is intermediate between *Chiloscyphus* and *Heteroscyphus*. In examining a large series of specimens from various parts of North America the writer has seen nothing to contradict the statements of Schiffner, all of the androecia found agreeing closely with those in typical *Chiloscyphus* species. What

[1] Kongl. Sv. Vet. Akad. Hand. **23**[5]: 24. 1889.
[2] Oesterr. Bot. Zeitschr. **60**: 169. 1910.

the short male branches described by Stephani and Müller really represent is difficult to determine. Possibly they belong to some other species mixed with the plant in question. In any case, if they are never produced by the true *Ch. ascendens*, one of the most important differences between this species and its allies falls away.

Müller adds further that the female inflorescence is borne on a branch springing from the axil of an underleaf, that the perichaetial bracts equal in size or exceed the other leaves, and that their margins are not toothed but often bear gemmae in small numbers. He finds gemmae also on the lobes of the perianth and on the male bracts and compares them with the gemmae of *Lophocolea minor* Nees. The writer has sought in vain to confirm these various statements. He finds instead that the female branches are always lateral, that the perichaetial bracts are smaller than the normal leaves and variously lobed or cleft, and that no gemmae whatever can be demonstrated. Here again the possibility of an admixture in Müller's material suggests itself.

It will be seen from the foregoing remarks that *Ch. ascendens* is based on very vague characters. Even the differences in the size of the leaf-cells, upon which Schiffner places most reliance, are open to criticism. In the specimens distributed by Underwood and Cook,[1] for example, which are cited by Schiffner as belonging to *Ch. ascendens*, the marginal cells average 35 μ in width and the median cells about 50 μ in length. And yet in the Californian specimens collected by Baker and Nutting and referred by Schiffner to *Ch. pallescens* the cells give almost identical measurements. By computing averages from four specimens determined by Schiffner as *Ch. ascendens* the marginal cells were again found to measure 35 μ in width, while the median cells were only 47 μ in length. Similar averages from four specimens referred to *Ch. pallescens* yielded 35 μ for the marginal cells and 51 μ for the median cells. A mean difference of only 4 μ in the length of the median leaf-cells is surely of very slight significance, especially in plants where the cells are subject to so much variation in size.

On a cursory examination the perianths still seem to yield differential characters of importance. In a typical *Ch. pallescens* these organs are small and deeply trifid with more or less spiny lobes. The lobes

[1] Hep. Amer. *125*.

are erect or more or less spreading and the portion of the perianth below them is cylindrical or slightly flaring in the upper part. As the capsule approaches maturity the calyptra grows out beyond the perianth. In *Ch. ascendens* the perianth is large and only slightly trifid, although the margins are much the same as in typical *Ch. pallescens*. The lobes themselves sometimes spread widely and sometimes bend inwards until almost in contact. The portion of the perianth below the lobes is strongly inflated but sometimes presents the appearance of being contracted in the upper part. Even at maturity the perianth exceeds the calyptra in length. Between these two extremes, however, are numerous intermediate conditions. Some of these are noted by Schiffner, who states that he does not attach very great importance to differences in the size or form of the perianth or in the relative lengths of perianth and calyptra. Under *Ch. lophocoleoides*, for example, which he considers a variety of *Ch. pallescens*, he calls attention to plants from Tirol and Salzburg in which the perianth agrees essentially with that of *Ch. ascendens*, while the leaf-cells are larger than in what he considers the typical form of that species. Under *Ch. ascendens* he notes a plant from Norway with the cells of *Ch. ascendens* and a perianth approaching that of the same species but a little smaller and less inflated than in the American and Siberian specimens which he had studied. These are the forms which he suggests may belong to *Ch. ascendens*, although he leaves their determination in doubt.

The writer in his own experience has sometimes found very diverse perianths even in a single tuft of plants. In fact the range of variation is so wide and at the same time so indefinite that it seems impossible to separate *Ch. ascendens* from *Ch. pallescens* on the basis of characters drawn from the perianth. There are, indeed, intermediate forms between the two extremes which one student might refer to *Ch. ascendens* but which another student with equal reason might refer to *Ch. pallescens*. This being the case it seems advisable to include *Ch. ascendens* under *Ch. pallescens* as a slightly aberrant form. There is even a question as to whether *Ch. pallescens* ought to be separated specifically from *Ch. polyanthus*. Schiffner considers it a matter of taste whether it be looked upon as a "kleine Art," a subspecies, or a variety. The difference in the size of the leaf-cells is the only character in which he places much confidence, and this he admits is far from constant. If, however, *Ch. ascendens* is included under

Ch. pallescens the species will then present a range of variability in the perianth which far exceeds anything found in *Ch. polyanthus*. It seems logical, therefore, to recognize *Ch. pallescens,* at least as a "kleine Art."

6. Chiloscyphus fragilis (Roth) Schiffn. Lotos **58**: (27). 1910; Beih. zum Bot. Centralbl. **29**²; 90. *pl. 1, f. 7–14; pl. 2, f. 20, 21.* 1912. *Jungermannia fragilis* Roth, Fl. Germ. **3**¹: 370. 1800. *Chiloscyphus polyanthus,* var. *erectus* Schiffn. Lotos **48**: 332. 1900. *Ch. polyanthus,* var. *fragilis* C. Müll. Frib.; Rabenhorst's Kryptogamen-Flora **6**: 823. 1911. In pools, slow streams, and wet meadows. Maine: Auburn (*E. D. Merrill*); Round Mountain Lake, Franklin County (*Miss Lorenz*). New Hampshire: Fraconia Notch (*A. W. E.*). Massachusetts: Magnolia (*W. G. Farlow*). Connecticut: Bethany, Middletown, Winchester, and Windsor (*A. W. E.*); Killingworth (*G. E. Nichols*). The Massachusetts station has already been recorded by Schiffner. Until very recently the aquatic and subaquatic forms of *Chiloscyphus* were indiscriminately referred to *Ch. polyanthus,* var. *rivularis.* A few years ago, however, Warnstorf[1] brought out the fact that these forms exhibited considerable diversity, and Loeske[2] soon afterwards restricted the name *rivularis* to a definite series of forms, separating them from *Ch. polyanthus* as a distinct species (see below). The remaining forms included by the older writers under the variety *rivularis* have since been more clearly defined by Schiffner, who has revived for the series the old name *fragilis,* as indicated above, and restored it to specific rank.

According to Schiffner's description *Ch. fragilis* is considerably larger than its allies, the stems being thick and fleshy and the leaves often attaining a length of 2 mm. or more. The stems are rarely branched, the leaves are rotund-quadrate in outline and usually as broad as long, while the leaf-cells in typical forms of the species are among the largest in the genus, measuring 35–40 μ just within the margin. In the American variety *Sullivantii* Schiffn., however, he recognizes a form in which the submarginal cells are only 30 μ in diameter. The perianth agrees closely with that of *Ch. polyanthus* and is far surpassed by the calyptra when the capsule reaches maturity.

The variety *Sullivantii,* based upon Sullivant's Musci Alleg. *No. 248,* seems to be not uncommon in New England. The Massachu-

[1] Kryptogamenfl. der Mark Brandenburg **1**: 252. 1902.
[2] Verhandl. Bot. Ver. Porv. Branbendurg **46**: 172. 1904.

setts specimen is referred to this variety by Schiffner himself and agrees closely with most of the specimens from Connecticut. Instead of growing in quiet pools, where typical forms of the species flourish, the variety grows on rocks and stones in brooks. Schiffner states that no similar form has been found in Europe and suggests that the American plant ought perhaps to be raised to specific rank. Aside from the slightly smaller leaf-cells, however, it seems to show no good differential characters, and it is probable that the differences in the size of the cells are associated in some way with the differences in habitat. In any case the writer is inclined for the present to include the var. *Sullivantii* among the forms of *Ch. fragilis.*

Although there is usually little difficulty in recognizing *Ch. fragilis,* the diagnostic characters, as indicated above, are drawn from differences in general appearance, in habit, and in size, rather than from morphological or structural differences. Even the size of the leaf-cells, which Schiffner emphasizes especially, is subject to considerable variation, and the differences in the form of the leaves are too slight and too inconstant to be considered seriously. According to Müller the characteristic features of *Ch. fragilis* are due entirely to environmental factors and disappear when the plant establishes itself in drier localities. Under these circumstances, in his opinion, the plant becomes quite indistinguishable from *Ch. polyanthus.* Schiffner shows pretty conclusively that this is not the case. He describes a variety *subterrestris* of *Ch. fragilis,* which grew in a locality alternately wet and dry, and shows that this is distinct from *Ch. polyanthus.* He admits also a variety *submersus* Loeske of *Ch. polyanthus,* which has slightly larger cells than the typical form of the species but which is evidently distinct from *Ch. fragilis.* According to Macvicar, who retains *Ch. fragilis* as a variety under *Ch. polyanthus,* the plant is even closer to *Ch. pallescens* and cannot always be distinguished from it. He emphasizes the more opaque and rarely emarginate leaves, those of *Ch. pallescens* being translucent and frequently emarginate.

Aside from the New England stations listed above, *Ch. fragilis* may be recorded from the following North American localities: Torbay, Newfoundland (*Howe & Lang, 1358*); near Montreal, Quebec (*Dupret*); Port Renfrew, Vancouver Island (*Miss Gibbs*); Tacoma, Washington (*Flett*); Yosemite Valley, California (*Cooke*); Tate Mine, near Marysvale, Utah (*Jones*). The last named specimen belongs to the variety *calcareus* Schiffn.

7. Chiloscyphus rivularis (Schrad.) Loeske, Verhandl. Bot. Ver. Prov. Brandenburg **46**: 172. 1904. *Jungermannia pallescens, β rivularis* Schrad. Syst. Samml. Krypt. Gew. **2**: 7. 1797. *Chiloscyphus polyanthus, β rivularis* Nees, Naturgeschichte der europ. Leberm. **2**: 374. 1836. Submerged in brooks, sometimes exposed to the air through the drying up of the water. New Hampshire: Shelburne (*W. G. Farlow*); Waterville (*Miss Lorenz*). Vermont: Jerico (*A. W. E.*); Newfane (*A. J. Grout*). Massachusetts: Lynn, Reading, and Woburn (*C. C. Kingman*). Rhode Island: Cranston (*J. F. Collins, 1851a*). Connecticut: New Haven and Ledyard (*A. W. E.*); Bolton, East Haven, Portland, and Stafford (*G. E. Nichols*); Canterbury (*Mrs. Hadley*); Plainfield (*J. L. Sheldon*). Widely distributed in North America, the known range extending from Newfoundland west to British Columbia and south to Pennsylvania and California.

The present species, as understood by Schiffner, is apparently the most abundant representative of the genus in North America as well as in Europe. In its most typical condition the shoots, which are about half as large as in *Ch. fragilis,* develop numerous widely spreading branches, the leaves are deep green in color and longer than broad, while the leaf-cells are small, averaging about 25 μ in the middle of the leaf. The perianth is much the same as in *Ch. polyanthus,* and the calyptra is exserted at maturity. Apparently perianths are never produced when the plants are completely submerged but only when they are more or less exposed to the air. This fact is brought out by Schiffner, who also calls attention to the changed appearance of the plants under these circumstances. The branches, for example, are less numerous and spread more obliquely, while the leaves become more crowded and acquire a paler and more yellowish hue. In other words these subterrestrial modifications (forma *subterrestris* Schiffn.) show a striking resemblance to ordinary *Ch. polyanthus.* According to Müller they actually represent *Ch. polyanthus* and he therefore considers *Ch. rivularis* a mere environmental form and unworthy of recognition as a species. Schiffner, on the other hand, maintains that his position (which is also that of Loeske) is correct and that the subterrestrial forms of *Ch. rivularis* merely resemble *Ch. polyanthus* superficially without losing their specific characteristics. He points out, among other things, that they still retain their small leaf-cells although he admits that the cells are not quite so small as in typical submerged conditions. He describes, however, a new submerged

variety (var. *subteres* Schiffn.) in which the cells are fully as large as in the subterrestrial modification of the typical form. According to his account this variety also passes over into a subterrestrial condition, which he implies is quite indistinguishable from that of the typical form. He supports his position still further by citing a locality in Bohemia where typical *Ch. polyanthus* and the subterrestrial form of *Ch. rivularis* grow side by side and even intermingled without passing into each other. Schiffner regards *Ch. rivularis* as a species with a wider range of variability than is ascribed to it by Loeske and considers this variability as one of the peculiarities of the plant.

In North America the typical *Ch. rivularis* seems to have been rarely collected. Much of the material examined by the writer belongs to the variety *subteres*, characterized not only by its larger leaf-cells but also by its less squarrose branches and by its larger and more crowded leaves. The latter are not explanate as in the normal form of the species but are more or less ascending and often give the branches a subterete appearance. The forma *subterrestris*, also, is known from a number of localities. Although *Ch. polyanthus* has been recorded from each of the New England states, the exclusion of the forms now referred to *Ch. fragilis* and *Ch. rivularis* reduces the number of New England stations which the writer can definitely quote to two, namely: Katahdin Iron Works, Maine (*E. D. Merrill*) and Brookfield, Connecticut (*A. W. E.*). *Ch. pallescens* seems to be more abundant. Specimens have been examined from Maine, New Hampshire, Massachusetts, and Connecticut, and the species is reported also from Rhode Island (under the name *Ch. ascendens*) in Bennett's "Plants of Rhode Island."

8. Cephaloziella bifida (Schreb.) Schiffn. Lotos **48**: 340. 1900. *Jungermannia bifida* Schreb.; Schmidel, Icon. Plant. et Anal. Ed. II. 250 (footnote). *pl. 64, f. II.* 1797. *Cephalozia bifida* Lindb. Musc. Scand. 4. 1879. On sandy and turfy earth. Massachusetts: Magnolia (*W. G. Farlow*); Reading (*C. C. Kingman*). Connecticut: Hamden and Middlefield (*A. W. E.*); East Hartford and Groton (*Miss Lorenz*). The determinations of *C. bifida* and of the following species of *Cephaloziella* were made by Professor Douin, of Chartres, France. At the present time the limits of *C. bifida* are not clearly understood, so that it is difficult to give an idea of its geographical distribution. It has been reported, however, from numerous scattered localities in Europe, Asia, and North America.

According to Macvicar[1] *C. bifida* should include *C. Hampeana* (Nees) Schiffn. as a synonym, but both Schiffner and Douin advocate keeping them apart, at least tentatively. The species shares with *C. Hampeana* its autoicous inflorescence, its bifid leaves with entire lobes and its sparingly dentate or subentire bracts and bracteoles. The leaves, however, as Schiffner points out, are smaller than those of *C. Hampeana,* the lobes are narrower, being usually only four cells wide at the base, the sinus is also narrower because the lobes spread less widely, and the leaf-cells have thicker walls. Whether the plant is actually the same as *Jungermannia bifida* Schreb. is perhaps doubtful. Lindberg considered that they were probably identical but did not state that he had examined an authentic specimen of Schreber's plant. This was described and figured from German specimens, but although the original account indicates a species of *Cephaloziella,* it does not point to any definite species with certainty. The synonymy of the plant, on the whole, is in need of further elucidation.

9. Cephaloziella byssacea (Roth) Warnst. Kryptogamenfl. der Mark Brandenburg **1**: 224. 1902. *Jungermannia byssacea* Roth, Fl. Germ. **3**^{1}: 307. 1800. *J. divaricata* Smith; Sowerby, Eng. Bot. *pl. 719.* 1800. *Cephalozia byssacea* Dumort. Recueil d'Obs. sur les Jung. 18. 1835. *Jungermannia Starkii* Nees, Naturgeschichte der europ. Leberm. **2**: 223. 1836. *Cephalozia Starkii* Dumort.; Cogniaux, Bull. Soc. roy. Bot. de Belgique **10**: 285. 1872. *Cephalozia divaricata* Dumort. Hep. Europ. 89. 1874. *C. divaricata, β Starkii* Spruce, On Cephalozia 64. 1882. *Cephaloziella divaricata* Schiffn.; Engler & Prantl, Nat. Pflanzenfam. **1**^{3}: 99. 1895. *Cephaloziella Starkii* Schiffn. Lotos **48**: 341. 1900. On rocks, banks, sandy earth, and rotten logs. New Hampshire; Lower Greeley Pond, Waterville (*Miss Lorenz*). Massachusetts: Gloucester (*W. G. Farlow*); Saugus (*C. G. Kingman*). Connecticut: New Haven (*J. A. Allen*); East Haven, North Haven, and Ledyard (*A. W. E.*); Vernon (*G. E. Nichols*). The East Haven specimens were distributed in Underwood & Cook's Hep. Amer. *155,* as *Cephalozia divaricata.* The species is very widely distributed in Europe, Asia, and North America.

At the present time three names are being used for the above plant, namely: *C. byssacea, C. divaricata,* and *C. Starkii.* Those who use the first name follow the authority of Heeg,[2] who studied Roth's original

[1] Student's Handb. of British Hepatics 275. 1912.

[2] Verhandl. der k. k. zool.-bot. Gesellsch. in Wien **43**: 96. 1893.

material in the Lindenberg herbarium and pronounced it identical with *Jungermannia Starkii* Nees. Those who use the second name may well base their choice on the statements of Spruce,[1] who examined Smith's original specimens, collected "on heaths, near Holt, Nov. 1798," by Rev. Mr. Francis, and found that they too were identical with *J. Starkii.* Those who use the third name maintain that both *byssacea* and *divaricata* have been used in so many different senses that the names no longer have definite meanings. The adherents of the first two names, according to the principles of priority, seem to have more in their favor. Unfortunately both *J. byssacea* and *J. divaricata* were published in the same year, 1800, so that the employment of either must rest on a purely arbitrary choice. In selecting *byssacea* rather than *divaricata* the writer merely follows the example of Warnstorf and Macvicar.

In its restricted sense *C. byssacea* is characterized by a dioicous inflorescence, by entire leaf-lobes, by more or less distinct underleaves, and by sharply toothed bracts and bracteoles. The older writers, however, including Spruce, understood the species in a much broader sense, including under it *C. Hampeana, C. bifida, C. papillosa,* and probably other species which are now considered distinct. The older records of *C. byssacea* (and *C. divaricata*), therefore, should not be accepted without re-examination.

10. CEPHALOZIELLA PAPILLOSA (Douin) Schiffn. Oesterr. Bot. Zeitschr. **55**: (5). 1905. *Cephalozia asperifolia* C. Jens. Meddel. om Grønland **15**: 372. *f. 1–5.* 1898. *C. divaricata,* var. *scabra* M. A. Howe, Mem. Torrey Club **7**: 129. 1899. *C. papillosa* Douin Rev. Bryol. **28**: 72. 1901. *Cephaloziella Douinii* Schiffn.; Douin, l. c. (in obs.). *Cephalozia asprella* Steph. Bull. de l'Herb. Boissier II. **8**: 507. 1908. *Cephaloziella byssacea,* var. *asperifolia* Macv. Student's Handb. British Hepatics 275. 1912. On rocks. Melrose, Massachusetts (*C. C. Kingman*). Meriden, Connecticut (*Miss Lorenz*). New to New England. Widely distributed in Europe and North America. The present species, although striking in appearance when typical, is very closely related to *C. byssacea.* It is characterized by its rough leaves, the roughness being due to small cuticular papillae or to larger outgrowths composed of one or more projecting cells. Oftentimes the margins of the lobes are more or less dentate or even spinose-dentate at the base. Unfortu-

[1] Ann. & Mag. Nat. Hist. II. **4**: 112. 1849.

nately these peculiarities are not always present, many of the leaves being smooth and with entire lobes, and the occurrence of plants of this character makes it difficult to define *C. papillosa* sharply. The difficulty is clearly stated by Howe, in his account of the variety *scabra,* and deterred him from describing the plant as a distinct species. Even Douin and Schiffner, who admit its validity, do so tentatively and state expressly that it is nothing more than a "kleine Art," or a species in process of formation. Possibly the roughness of the leaves is brought about by external factors, and Douin suggests that it may be associated with a slow growth of the plant and with the development of gemmae.[1] This idea, however, can be regarded as nothing more than an hypothesis, especially since smooth and rough forms sometimes grow together and since smooth forms sometimes produce gemmae.

It will appear from the synonymy that the specific name *asperifolia* is older than *papillosa.* Unfortunately the first name is not available, on account of an earlier *Cephalozia asperifolia* (Tayl.) Spruce,[2] from the Madeira Islands. This plant is known at the present time from Taylor's original description only. On the basis of this description Spruce first referred the species to the genus *Anthelia*[3] but afterwards transferred it to the subgenus *Prionolobus* of the genus *Cephalozia.* Stephani retains it in the same position.[4] According to Mitten[5] the Madeira species is synonymous with *Trigonanthus dentatus* (Raddi) Mitt., but this idea is not tenable because *T. dentatus* has a smooth cuticle. Schiffner[6] suggests that *Jungermannia asperifolia* Tayl. and *Cephalozia asperifolia* C. Jens. may possibly be identical. Of course, if this should ever be proved to be the case, the name *asperifolia* could then be revived for the present species.

11. Anthoceros carolinianus Michx. Fl. Bor.-Amer. **2**: 280. 1803. On a log, at the border of a pond. New Haven, Connecticut (*G. E. Nichols*). In Howe's monograph on the Anthocrotaceae of North America he cites sterile specimens of an *Anthoceros* from New Haven, collected by D. C. Eaton, which he refers somewhat doubtfully to *A. carolinianus.*[7] The present specimens are fertile and agree

[1] Bull. Soc. Bot. France **52**: 147. 1905.

[2] Hep. Amaz. et And. 508 (footnote). 1885. (= *Jungermannia asperifolia* Tayl. Lond. Jour. Bot. **5**: 277. 1846.)

[3] On Cephalozia 83. 1882.

[4] Bull. de l'Herb. Boissier II. **8**: 508. 1908.

[5] Godman's Nat. Hist. Azores 318. 1870.

[6] Oesterr. Bot. Zeitschr. **55**: (6). 1905.

[7] Bull. Torrey Club **24**: 7. 1898.

closely with Howe's description and with authentic material, so that the species may now be definitely recorded as a member of the New England flora. As Howe explicitly states, *A. carolinianus* is very close to *A. levis* L. and ought perhaps to be regarded as an aquatic or subaquatic modification of the commoner species. It is, however, considerably larger, the involucres are longer and scarcely or not at all expanded at the mouth, and the capsules are relatively more slender. In other respects the two species are much the same. The range of *A. carolinianus* is typically southern and Howe reports it from numerous localities in the Southern States.

The additions to local state floras, not already mentioned in the preceding pages, are as follows: —

For Maine. *Pallavicinia Flotowiana, Pellia Neesiana, Cephaloziella elachista, Scapania apiculata,* and *S. subalpina;* Round Mountain Lake and vicinity, Franklin County (*Miss Lorenz*).

For Vermont. *Calypogeia sphagnicola, C. tenuis, Cephalozia fluitans,* and *Lophozia marchica;* Franklin (*Miss Lorenz*). *Scapania curta;* Rochester (*D. L. Dutton*). It should be noted also that the Vermont record for *Lepidozia setacea* may now be definitely marked with the sign "+", the necessary specimens having been collected by Miss Lorenz.

For Massachusetts. *Cephaloziella Sullivantii;* Reading (*C. C. Kingman*). *Lophocolea minor;* Stoneham and Woburn (*C. C. Kingman*).

For Rhode Island. In Bennett's "Plants of Rhode Island," published in 1888, the following species of Hepaticae are among those recorded: *Riccia lamellosa, Fossombronia angulosa, Jungermannia Helleriana, Lejeunea serpyllifolia, L. echinata,* and *Radula tenax.* These species were all omitted from the writer's "Preliminary List of New England Hepaticae,"[1] because there was so much uncertainty about them. It is perhaps advisable, however, to record them with the sign "—". If this is done *Riccia lamellosa* should be listed as *R. Austini, Fossombronia angulosa* as *F. salina, Jungermannia Helleriana* as *Sphenolobus Hellerianus, Lejeunea serpyllifolia* as *L. cavifolia,* and *L. echinata* as *Cololejeunea Biddlecomiae.* Another species, reported by Bennett under the name *Coleochila Taylori* is cited in the "Preliminary List" as *Mylia Taylori.* This probably represents *M.*

[1] Rhodora **5**: 170–173. 1903.

anomala and should be so listed. There are still twenty-five Rhode Island species which are known to the writer through published records only.

For Connecticut. *Lophozia marchica;* Bethany (*Miss Lorenz*).

The census of New England Hepaticae now stands as follows: Total number of species recorded, 177; number recorded from Maine, 123; from New Hampshire, 130; from Vermont, 109; from Massachusetts, 96; from Rhode Island, 77; from Connecticut, 134; common to all six states, 52.

YALE UNIVERSITY.

A NORTHEASTERN VARIETY OF CHELONE GLABRA.

M. L. FERNALD AND K. M. WIEGAND.

THE common *Chelone glabra* from New England to Kentucky and the region of the Great Lakes has leaves of a more or less lanceolate outline, gradually tapering to a long slender tip and ordinarily narrowed to a very short-petioled base. This common plant, judging from the Linnean description, "Chelone foliis lanceolatis serratis," [1] is typical *C. glabra*.

In Newfoundland, Prince Edward Island, northern Maine and Quebec, however, specimens of *Chelone* show a general tendency toward a more oblong-ovate outline of the leaves and lower bracts. The bases of the upper leaves and foliaceous bracts are also commonly rounded or even occasionally subcordate. On comparing this broad-leaved northern extreme with the more southern typical *C. glabra* it becomes apparent that in a majority of the specimens of the broad-leaved extreme the leaves increase in size to the base of the inflorescence, while in the plant with the lanceolate leaves tapering to the petiole the leaves at or near the middle of the stem are larger than those above. Occasional specimens in each series, however, occur with the middle and upper leaves nearly uniform in size. The outline of the leaves is somewhat variable in each series, showing occasional transitions, so that, although the majority of the specimens

[1] L., Sp. Pl. 611 (1753).

in the two series seem as readily separable as are *C. glabra* and *C. obliqua,* in the absence of any other characters the broad-leaved northern plant seems best treated as a geographical variety. This tendency to a development of large upper leaves and foliaceous bracts in *C. glabra* is paralleled in the same geographic area by several other cases; for example, *Eupatorium purpureum,* var. *foliosum* Fernald and *Solidago rugosa,* var. *villosa* (Pursh) Fernald.

The broad-leaved extreme of *Chelone glabra* seems not to have been definitely recognized in literature, although it is probable that Hooker's description in the Flora Boreali-Americana of *C. glabra:* "foliis ovato-lanceolatis"[1] was based at least in part upon it, while his "*var. β* lanceolata *Nutt.*" was apparently the more widely distributed narrow-leaved plant. This interpretation of Hooker's treatment is the more probable from his citation of specimens:— "Hab. α. and β. Canada. Newfoundland, *Dr. Morison.* New Brunswick. *Mr. Kendal.*" But since Nuttall's var. *lanceolata* is generally identified with the southern *C. obliqua* L. it is evident that Hooker's application of the name to the northern plant was through misinterpretation.

Since the broad-leaved northern variety has not been definitely distinguished from *C. glabra* it is here proposed as:—

C. glabra L., var. **dilatata**, var. nov., foliis oblongo-lanceolatis vel oblongo-ovatis, supremis fere majoribus quam mediis 6–13 cm. longis 2.5–5 cm. latis basi rotundatis vel subcordatis.

Leaves oblong-lanceolate or oblong-ovate; the upper ordinarily larger than those near the middle of the stem, 6–13 cm. long, 2.5–5.5 cm. wide, their bases rounded or subcordate.— Newfoundland, Prince Edward Island, Quebec, and northern Maine. Type, swampy thicket on carboniferous sandstone, Stephenville, Newfoundland, August 15, 1910, *Fernald & Wiegand,* no. 3941 (in Gray Herb.). Other specimens examined. Newfoundland: boggy open woods, Whitbourne, August 8, 1911, *Fernald & Wiegand,* no. 6136; margin of a woodland brook, Clarenville, August 19, 1911, *Fernald & Wiegand,* no. 6138; wet thickets, Norris Arm, August 21 & 22, 1911, *Fernald & Wiegand,* no. 6139; low damp clearings, Grand Falls, August 14, 1911, *Fernald & Wiegand,* no. 6137; boggy places in the strand, Birchy Cove, August 22, 1910, *Fernald & Wiegand,* no. 3942. Prince Edward Island: swale, Mt. Stewart, July 30. 1912, *Fernald, Bartram, Long & St. John,* no. 7995; springy railroad ditch, Bloomfield, August 7, 1912, *Fernald, Long & St. John,* no. 7996. Quebec: moist ground, Lake Edward, August 24, 1904, *W. F. Wright,* no. 177. Maine: gravelly thicket, Boundary Lake, Aroostook County, August 12, 1902, *Eggleston & Fernald.*

[1] Hook. Flor. Bor.-Am. II. 94 (1840).

RANGE EXTENSIONS OF RHAMNUS FRANGULA AND SPOROBOLUS ASPERIFOLIUS.

EARL E. SHERFF.

THERE seems to have been gathered heretofore no evidence that *Rhamnus Frangula* L. and *Sporobolus asperifolius* Nees & Meyen were established in Illinois. Britton's Manual credits the former with a range from Long Island to New Jersey, also (as being "reported from") Ontario; and the latter, with a range from Assiniboia to British Columbia, south to Missouri, Nebraska, California and Mexico. Gray's New Manual (7th edition) states that *Rhamnus Frangula* is established in Ontario, on Long Island and in northern New Jersey; while of *Sporobolus asperifolius* it makes no mention. Nor does a careful search among the specimens in the Herbarium of Field Museum show either species to have been found before in Illinois.

The writer has found both of these species growing in Illinois the past season, and well established. Several tall shrubs of *Rhamnus Frangula* were found in Skokie Marsh, west of Glencoe, Illinois, June 8, 1912. These were growing in a dense thicket on a somewhat elevated area of ground toward the center of the marsh. Presumably birds had previously obtained the drupes in Glencoe, more than a mile distant, where the species is used for ornament, and the hard nutlets had been deposited in Skokie Marsh.

Sporolobus asperifolius was found north of Elgin, Illinois, August 27, 1912. It occurred in a small but very dense patch on wet, swampy soil along the C. M. & St. P. R. R. tracks. The culms were decumbent at the base and were much branched. The panicles were well developed, but none had reached the length (15 to 20 cm.) frequently attained by western plants referred to this species. Evidently the species had come from the West by way of the railroad.

Specimens of both species have been deposited in the Herbarium of Field Museum.

CHICAGO, ILLINOIS.

A SEDUM NEW TO NORTH AMERICA.— Last summer, while passing through the village of South Bristol, Maine, I noticed an unfamiliar Sedum growing beside the road. The specimens collected could not

be satisfactorily determined from descriptions in any of the current manuals, so living material was sent to the Gray Herbarium, where Mr. E. W. Sinott kindly determined the plant as *Sedum anophyllum* DC., a species native to Southern and Southeastern Europe. Mr. Sinott also stated that, as far as could be learned, the species had never been reported before from North America as an escape, the only American material in the Gray Herbarium being two sheets collected from cultivated specimens by Geo. Thurber.

Upon further inquiry at South Bristol it appeared that the plant had been known in its present locality for eight or ten years, but had originally come from the garden of Mrs. Stephen Farrar, who, as my informant supposed, had brought a few roots from a garden in North Anson, Maine. Upon the destruction of Mrs. Farrar's garden, the plants were thrown out with other waste upon a ledgy lot between two roads, without further care. The Sedum, characteristically refusing to die, is now scattered over a space of about one and a half acres, growing in the crevices and along the borders of a dry, sloping ledge, and is apparently slowly spreading along the roadsides.

Specimens gathered in August have been deposited in the Gray Herbarium, in that of the New England Botanical Club, and in the Herbarium of the Brooklyn Institute Museum. Living specimens are also growing in the Brooklyn Botanic Garden.

The species is not listed by L. H. Bailey in the Cyclopedia of American Horticulture among those commonly cultivated, nor is it described in any of the texts usually accessible. Hence the following description may prove of service. A perennial herb; stems slightly woody, rooting at the decumbent base, but soon erect, 1–3 dm. high. Leaves oblong-cylindrical, fleshy, and cuspidate, closely imbricate and erect upon the sterile stems, more remote upon the flowering ones. Flowers about the size of those of *Sedum acre* L., yellow, sessile or nearly so, in crowded, terminal, subscorpioid cymes. Sepals lanceolate and acute, about half the length of the erect, linear, acute petals. Follicles erect, lanceolate-acuminate.

A more complete description, with keys, will be found in the Flore de France by G. Rouy and E.-G. Camus, Vol. vii. p. 107., and in the Conspectus Florae Graecae by E. de Halácsy, Vol. i. p. 586.— Edward B. Chamberlain, New York City.

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ALCHEMILLA ALPINA AND A. VULGARIS IN NORTH AMERICA.

M. L. Fernald and K. M. Wiegand.

The first record of an indigenous *Alchemilla* in northeastern North America was by Pursh who in his *Flora Americae Septentrionalis* (1814) reported *A. alpina* "On the peaks of high mountains in Vermont and New Hampshire,"[1] with, however, the qualifying and somewhat characteristic statement: "Whether the American species is the true *A. alpina* or not, I am not able to determine, as I am at present in want of specimens to compare them; but the plate in the Flora Danica represents the American plant fully, as far as recollection can decide." In the Flora of North America Torrey & Gray gave *A. alpina* from "Greenland: also on the summits of the White Mountains, New Hampshire, and Green Mountains, Vermont, according to Pursh; but this is extremely doubtful."[2] In the first edition of the Manual, after citing the plant from New Hampshire and Vermont on the authority of Pursh, Asa Gray added: "but no one else has found the plant in the country."[3] To the second edition of the Manual *A. alpina* was not definitely admitted, but Gray made the note: "A. alpina, L., is said by Pursh to grow on the Green and White Mountains, New England; but there is most probably some mistake about it."[4] This disposition of the case was maintained through the fifth edition; and in the sixth and seventh editions, since Pursh's record had remained unverified, the species was not even mentioned.

[1] Pursh, Fl. Am. Sept. 112 (1814).
[2] Torr. & Gray Fl. I. 432 (1840).
[3] Gray, Man. 119 (1848).
[4] Gray, Man. ed. 2, 115 (1856).

Since the White Mountains and the Green Mountains have been so extensively explored by botanists for fully a century and in all this time, so far as records show, no specimens of *Alchemilla* have ever been found there, it has long seemed evident that Pursh's report, based, as he himself said, merely on a recollection of some plant which he had seen, must have been an error and should be classed with his long discredited reports of *Dryas integrifolia* (*D. tenella*) and *Pleurogyne rotata* (*Swertia pusilla*) from the White Mountains.

Recently, however, in the *North American Flora* Rydberg has given the range of *Alchemilla alpina* in America as: "from Greenland to Miquelon and the White Mountains of New Hampshire."[1] As to the origin of the Miquelon record we have no information, but the species is not included in Delamare, Renauld, and Cardot's *Flora Miquelonensis* (1888), in Bonnet's *Florule des Isles Saint Pierre et Miquelon*,[2] nor in Waghorne's publications on Newfoundland and the French Islands. In his statement of range above quoted Rydberg does not include western North America, but in the Gray Herbarium there is a specimen collected by C. H. Demetrio, July 5, 1888, "On the trail to the Lake of the Clouds, Custer Co., Colorado," a station which, it would seem, is not generally known since there is no mention of the occurrence of the plant in Colorado either in Rydberg's *Flora of Colorado* or in Coulter and Nelson's *Manual of Rocky Mountain Botany*.

Although the records of *A. alpina* from New Hampshire and Vermont are probably errors, the fact that the plant has once been found in Colorado and is known in Greenland indicates that it should be watched for in Labrador, Newfoundland, and on the mountains of Gaspé.

The only *Alchemilla* clearly indigenous in northeastern America is the polymorphous *A. vulgaris* L., which by some European authors is considered as separable into many closely similar though distinct species, but by others is regarded as a single species with numerous sub-species, varieties and forms. A study of the plants in the field in Newfoundland and Labrador, and of all the available herbarium material from the Northeast convinces the writers that the characters commonly relied upon to separate species (mainly those of pubescence) are so highly variable as entirely to obscure any practical specific

[1] N. A. Fl., XXII. 379 (1908).
[2] Journ. Botanique, I. (1887).

limits. Nevertheless, in the regions of Newfoundland, Labrador and eastern Canada where the species has been found it shows in each geographical area fairly well marked though not constant tendencies in the distribution and direction of the trichomes. It seems to the writers, therefore, that these tendencies should be recognized, but should be regarded as geographical varieties, and not as species.

The most satisfactory statement of the characters of the forms of *Alchemilla vulgaris* is that given in Harald Lindberg's *Die Nordischen Alchemilla vulgaris-Formen.*[1] The writers, without claiming any originality, have therefore abstracted freely from the characterizations given by Lindberg, who, however, in his text has designated the forms by binomials.

The first report of *Alchemilla vulgaris* in America seems to have been by La Pylaie[2] who reports "l'*Alchemilla officinalis,* dans la partie inférieure des coteaux" of Quirpon Island near the northeastern extremity of Newfoundland, with the comment that he had seen it in no other part of Newfoundland. The next report seems to have been in Hooker's *Flora Boreali-Americana,* where Labrador specimens are cited but without definite locality. In 1870, D. A. Watt[3], reporting upon a collection of Labrador plants from the Rev. S. R. Butler, listed *A. vulgaris* as "abundant on hill-sides" about L'Anse Amour in southern Labrador.

In an editorial note in the Bulletin of the Torrey Botanical Club, in 1886, the late W. H. Leggett said: "In Nova Scotia, along roadsides, was also found the Ladies' Mantle, *Alchemilla vulgaris,* L., which is undoubtedly of European origin"[4] and in the following year Professor George Lawson,[5] referring to Leggett's note, said: "*Alchemilla vulgaris*....was first observed at Lucyfield, Halifax County, in the summer of 1864. There is but one patch, which I have seen in flower during every subsequent season; but it does not spread. Botanists here have not noticed it elsewhere. It would consequently be of interest to note the 'roadside' localities more specifically in a future number of the BULLETIN. The *Alchemilla* is an introduced plant of European origin (as you state); and I had not regarded the one patch found in 1864 as sufficient to establish it as a permanent

[1] Lindberg fil. Acta Soc. Sci. Fenn. XXXVII. no. 10 (1909).
[2] La Pylaie, Voy. à l'Ile de Terre-Neuve, 79 (1825).
[3] Watt, Can. Nat. Ser. 2, V. 351 (1870).
[4] Leggett, Bull. Torr. Bot. Club, XIII. 232 (1886)
[5] G. Lawson, Bull. Torr. Bot. Club, XIV. 10 (1887).

immigrant." Mr. Leggett, in response to Prof. Lawson's request, made the editorial note that the *Alchemilla* "was found at Digby, on the outskirts of the town in August, 1879, on the road toward 'the Joggins'"; and Dr. T. J. W. Burgess recorded *Alchemilla vulgaris:* "found in great abundance about Yarmouth, Nova Scotia, by Professor Macoun and myself in 1883, growing in fields, etc., bordering on the sea shore."[1] Macoun, in the *Catalogue of Canadian Plants,* adds to the Nova Scotia records North Sydney and Louisburg; and subsequently various stations in Newfoundland and Labrador have been reported. In 1906 Miss E. F. Fletcher found a few plants, reported as *A. pratensis,*[2] in a chicken yard at Westford, Massachusetts. At this last station the plant is obviously of casual introduction, and it is possible that in Nova Scotia the *Alchemilla,* as maintained by its discoverers, is introduced; but in Newfoundland and Labrador the plant is plainly indigenous, forming extensive colonies near streams upon calcareous slopes and gravels.

The varieties of *Alchemilla vulgaris* in North America, excluding Greenland, are as follows:

* Pubescence of stem and petioles spreading.

+ Pedicels and branchlets of the inflorescence glabrous: hypanthium glabrous or sometimes sparsely hirsute.

++ Stem hairy nearly up to the pedicels: upper surface of leaf glabrous or nearly so.

A. vulgaris L. Sp. Pl. 123 (1753). *A. pratensis* Schmidt, Flor. Boëmica inchoata, cent. III. 88 (1794?); Robinson & Fernald in Gray, Man. ed. 7, 493 (1908) in part; Rydberg, N. A. Flora XXII. 378 (1908) in part; Lindberg fil., Die Nord. Alchemilla vulg.-Formen, 88 (1909). *A. vulgaris, eu-vulgaris* b. *pratensis,* Asch. & Graeb. Syn. Mitteleurop. Fl. VI. Ab. i. 408 (1902).— Specimens examined. Nova Scotia: naturalized, railroad tracks and old fields bordering the sea, Yarmouth, June, 1883, *T. J. W. Burgess;* banks and meadows along the sea-coast, Yarmouth, June 22 & 25, 1883, *J. Macoun;* roadsides, Yarmouth, June 22–29, 1901, *Howe & Lang,* no. 114; moist roadside-bank, Yarmouth, Aug. 19, 1908, *Eames & Godfrey,* no. 7012; very common at Yarmouth, June 5, ——, *J. Macoun,* no. 80,665; ditches along the streets, Digby, Aug. 25, ——, *J. Macoun,* no. 80,666.

++ Stem hairy only at the base: leaves hairy above.

Var. **filicaulis** (Buser), n. comb. *A. filicaulis* Buser, Bull. Herb. Bois. I. App. ii. 22 (1893); Rydberg, N. A. Flora XXII. 378 (1908).

[1] T. J. W. Burgess, Bull. Torr. Bot. Club, XIV. 43 (1887).
[2] See Rhodora, IX. 92 (1907).

*A. vulgaris *filicaulis*[1] Murbeck, Bot. Notiser. (1895) 265. *A. vulgaris θ minor* Briq. in Burnat, Fl. Alp. Marit. III. 153 (1899), not *A. minor* Huds. Fl. Ang. 59 (1762) according to Lindberg fil. *A. minor *filicaulis* Lindb. fil. Nord. Alch. vulg.-Form. 96 (1909).— Specimens examined. NEWFOUNDLAND: without locality,. *Sir Joseph Banks;* open woods, Shoal Point, north of Bay of Islands, June 16, 1896, *Waghorne;* gravel of Steady Brook, near mouth of Humber River, July 15, 1910, calcareous cliffs, Steady Brook Falls, July 16, 1910, rocks close to water, marble-region of the Humber River, July 18, 1910, *Fernald & Wiegand,* nos. 3614, 3615, and 3616. Reported by Rydberg from Labrador.

+ + Pedicels, branchlets of the inflorescence, and the hypanthium hirsute: upper surface of leaf hairy.

Var. **vestita** (Buser), n. comb. *A. minor* Huds. Fl. Angl. 59 (1762) according to Lindberg fil. l. c. 91 (1909). *A. filicaulis* f. *vestita* Buser, Bull. Herb. Boiss. I. App. ii. 23 (1893). *A. vulgaris *vestita* Murbeck, Bot. Notiser. (1895) 265. *A. pratensis* Robinson & Fernald in Gray, Man. ed. 7, 493 (1908) and Rydberg, N. A. Flora XXII. 378 (1908), as to Massachusetts plant.— Specimens examined. LABRADOR: gravelly border of stream, Forteau, July 30, 1910, *Fernald & Wiegand,* no. 3617; abundant by streams and springs on calcareous terraces, Blanc Sablon, July 30, 1910, *Fernald & Wiegand,* no. 3618 (also observed on the QUEBEC side of the Blanc Sablon River). MASSACHUSETTS: introduced from Europe in a chicken yard, Westford, September 22, 1906, *Miss E. F. Fletcher* (RHODORA, IX. 92 (1907)).

* * Pubescence of stem and petioles appressed, sometimes very sparse: hypanthium glabrous.

+ Stems hairy nearly throughout: upper surface of leaves hairy to glabrous; veins beneath hairy from below the middle to the apex, and mesophyll somewhat hairy: flowers in glomerules.

Var. **comosa** (Brenner), n. comb. *A. glomerulans* Buser, Bull. Herb. Boiss. I. App. ii. 30 (1893); Rydberg, N. A. Flora, XXII. 378 (1908); Lindberg fil. l. c. 105 (1909). *A. obtusa,* var. *comosa* M. Brenner, Meddel. Soc. p. F. et Fl. Fenn. h. XXIII. 42 (1898). *A. vulgaris,* subsp. *sylvestris, β glomerulans* E. G. Camus in Rouy & Camus, Fl. Franc. VI. 456 (1900). *A. vulgaris *glomerulans* Ahlfvengr. in Neumann och Ahlfvengren, Sveriges Fl. 377 (1901).— Seen by us only from Greenland, but reported by Rydberg from Baffin Bay Region and Labrador.

+ + Stems hairy only below: upper surface of leaves glabrous except rarely on the veins; veins below hairy only near the apex; mesophyll glabrous: inflorescence diffuse.

[1] As used by the Scandinavian botanists asterisks and similar signs indicate subspecies as opposed to varieties.

Var. grandis Blytt, Enum. Pl. vasc. Christ. 21 (1844). *A. alpestris* Schmidt, Fl. Boëmica inchoata, Cent. III. 88 (1794); Lindb. fil. l. c. 127 (1909). *A. vulgaris* **alpestris* Murbeck, Bot. Notiser (1895) 266. *A. vulgaris δ alpestris* Briquet in Burnat, Fl. Alp. marit. III. 149 (1899).— Specimens examined. Labrador: l'Anse au Loup, August 21, 1892, *Waghorne*, Herb. Geol. Survey Canada, no. 8073. Quebec: Little Métis, August 15, 1898, *Mrs. Brodie*, Herb. Geol. Surv. Can., no. 19,513; *J. Fowler*, July 24, 1906.

RARE PLANTS IN GROTON, MASSACHUSETTS.

By Clarence H. Knowlton.

The town of Groton lies in the northwestern part of Middlesex County, Massachusetts, the second town south of the New Hampshire line. It is full of most interesting glacial deposits. A series of eskers and kames obstruct the drainage in the eastern part of the town, and enclose a chain of kettle-hole ponds. In the center of the town is a group of large drumlins, almost perfectly symmetrical, and to the west the land slopes down into a broad sand-plain, through which the Nashua and Squannacook Rivers flow, but little below the level of the plain.

In general, the flora is of the dry-woods, sand-plain type, but the drumlins and adjacent land are more fertile. Here the chestnut is a common tree. I have found in Groton the following plants which are of special interest. Three of them I have already announced in a previous article (Rhod. IX, 11–15, 1907) but the additional information here may be of interest.

In September, 1905, I discovered a single plant of *Linaria genistaefolia* Mill. by the railway embankment half a mile above the village. No other specimens were in sight, and I supposed the plant to be a waif. On October 9 of this year, however, I was surprised to find several good specimens along the Willow Road near the railway station. Later in the day I found a large colony on both sides of the highway, and spreading into an orchard, near my original station. There were at least 150 plants here, all in good flower and fruit. This plant is given in the sixth edition of Gray's Manual on the basis of

a station on the northern part of Manhattan Island. Britton's Manual (1901) gives the plant and this station, adding "now nearly or quite obliterated" so this Groton station seems to be a new and separate introduction from Europe. The plant is in several characteristics quite different from *Linaria vulgaris*, and is not likely to be confused with it. The habit of the plant is different, as it has several slender branches and is less leafy, with wider leaves than its congener. The flowers are lemon yellow, the "butter" without much of the "eggs." They are smaller, with a conspicuous sharp-pointed spur 7–10 mm. long. The capsules are 2.5–4 mm. in diameter, with slender pedicels 6–9 mm. in length.

Prof. K. M. Wiegand has recently called my attention to a specimen of *Amelanchier sanguinea* (Pursh) DC. in my herbarium. This I collected May 13, 1905, on an esker in the eastern part of the town, where it grew near *Epigaea* and *Hepatica triloba* in the shade of white pines. This shrub is a pronounced calciphile, and has been found in calcareous regions in Maine, Vermont, and western Massachusetts, but this is the first report in this State from east of the Connecticut River, and from a region not definitely calcareous.

Another shrub which often frequents limestone regions is abundant in the low land near Baddacook Pond close by, though very rare elsewhere in the county. This shrub is *Potentilla fruticosa* and was reported from this station by Dr. C. W. Swan in the Middlesex Flora (1888).

Lappula virginiana is abundant in thickets along the roadside over a mile from the village, where it has every appearance of being part of the original flora.

Another most interesting discovery this fall consisted of several medium-sized trees of *Betula nigra*. These grew on a gravelly knoll in a pasture between the village and the Groton School, fully two miles from the Nashua River. There was a straggling growth of *Betula populifolia* and white pines with these trees. This station is so far from the regular home of the species along the Merrimac, and in such dry soil as to suggest that the trees have been introduced. The tree is frequently set for ornament, but the pasture is too far from houses to make that likely in this case.

Hingham, Massachusetts.

NOTES ON THE ALGAE OF THE RIDEAU, ONTARIO.

A. B. Klugh, M. A.

The Rideau canal system runs from Kingston, Ontario, to Ottawa, the route being by way of the Cataraqui River, a chain of lakes and the Rideau River. In July, August and September, 1911, the writer made a reconnaissance of the Algal-flora of these waters as far as Lake Opinacon, some forty miles from Kingston. Most work was done at Kingston Mills, seven miles up from Kingston, and at Lake Opinacon.

The following is presented merely as a preliminary list, the species marked with an asterisk being here recorded from Canada for the first time.

Cyanophyceae.

Aphanothece microscopica, Naegeli. Among other Algae on stones and snags in Lake Opinacon.

Microcystis marginata, Kuetzing. As plankton in Lake Opinacon.

Coelosphaerium kuetzingianum, Naegeli. Common as plankton in Lake Opinacon. The main constituent of a very dense "Water-bloom" on parts of the "Lake of Sticks" just above the locks at Kingston Mills on September 11th.

**Anabaena flos-aquae*, Brébisson. Forming a "Water-bloom," in basin off the upper lock at Kingston Mills, July 15th.

**Dichothrix hosfordii*, Bornet. Common on submerged rocks in Lake Opinacon.

Rivularia pisum, Agardh. On drifting water-plants at Jones' Falls. On leaves of *Potamogeton amplifolius* in Lake Opinacon.

**Rivularia incrustata*, De Toni. Forming gelatinous nodules on stems of *Scirpus americanus* near the mouth of the Cataraqui River, July 22.

Chlorophyceae.

Spirogyra weberi, Kuetzing. In the Cataraqui River near its mouth. This material was so abundantly fruited that it was difficult to find a vegetative cell.

Nephrocytium agardhianum, Naegeli. Among plankton in Lake Opinacon.

Tetraedron minimum, Hansgirg. Plankton, Lake Opinacon.

Tetraedron regulare, Kuetzing. Plankton, Lake Opinacon.

Scenedesmus bijuga, Wittrock. Plankton, Lake Opinacon.

Scenedesmus quadricauda, Brébisson. In plankton, Lake Opinacon.

Coelastrum microporum, Naegeli. Among plankton, Lake Opinacon.

Hydrodictyon reticulatum, Lagerheim. Common in a pool below the falls at Kingston Mills, July 15th.

Pediastrum boryanum, Meneghini. Common in plankton, Lake Opinacon.

**Pediastrum duplex*, Meyer. Plankton, Lake Opinacon.

Pediastrum tetras, Ralfs. Plankton, Lake Opinacon.

Gloiococcus mucosus, A. Braun. Scarce in plankton, Lake Opinacon.

**Coleochaete soluta*, Pringsheim. Common on *Potamogeton amplifolius* in Lake Opinacon.

**Coleochaete orbicularis*, Pringsheim. On drifting water-plants at Jones Falls. Common on *Potamogeton amplifolius* in Lake Opinacon.

Cladophora fracta, Kuetzing. Floating in great masses at the mouth of the Cataraqui River.

Botanical Department, Queen's University,
Kingston, Ontario.

The pink-flowered Form of Lupinus perennis.— It has been known for a long time that our common Lupine, *Lupinus perennis* L., occasionally varies from the typical blue or purplish-blue to pink or white, and our manuals contain frequent references to this fact. In the Bulletin of the Torrey Botanical Club for 1890, volume XVII, page 124, Dr. N. L. Britton made the following note, "*Lupinus perennis* L., forma *rosea*. Flowers beautifully pink. May's Landing, Atlantic Co., [New Jersey] Dr. J. E. Peters." As long ago as 1814, Pursh in his Flora Americae Septentrionalis, vol. II, page 467, says, "Flowers blue, purple, and sometimes white." Emma J. Cole in the Grand Rapids Flora [Michigan], 1901, page 96, says, "Flowers are blue, white, purple or pink; forms with pink flowers are found along Hogadone Creek (W. M. Clark)." In the Michigan Flora by W. J. Beale and C. F. Wheeler, 1892, page 83, we read, "Flowers, a fine blue-purple, varying to light pink." And to cite one more reference, in Plants of Monroe County, New York, and adjacent Territory by

Florence Beckwith and Mary E. Macauly, 1896, page 56, is the following statement in regard to this Lupine, "A form with pink flowers occurs near the 'sand cut' in Penfield." These references to variations from the normal color are a few taken from a number of similar records and they show that departures from the typical color are not very infrequent, and yet are of sufficient interest to be cited at times as to locality. My excuse for offering one more example is the fact that I had some freshly gathered plants put into my hands, and this enabled me to examine in some detail the color of the flowers.

On May 30, 1911, Mr. John Murdock brought me a large bunch of pink Lupine collected that same morning in Namequoit, Massachusetts, where he has a summer home. I am indebted to Mr. Murdock for an account of the stations where the plant occurs. The typical blue form was very abundant near his home over the sandy areas that prevail on Cape Cod. Scattered among these on opposite sides of Potanumicut River were the pink forms. The original station, the one from which came the specimens brought to me, covered an area of about one acre, the plants growing in scattered patches from one to four feet across. This station was in good condition on May 30, 1912. The second station was half a mile below the first and contained a number of plants scattered among the normal ones. The third station was half a mile further down on Old Field Point near the mouth of the river. Mr. Murdock has made special inquiries and he finds no evidence that this pink form was introduced, while its occasional occurrence throughout eastern United States, the general range of the species, would lead one to look for it wherever the type grows. Mr. John Kenrick who lives near the area covered by the Lupine has told Mr. Murdock that the pink form has been there for years.

As to the color of the flowers, the keel was a soft, light pink which continued in the adjoining portions of the lateral petals, but turned gradually to a deeper hue in their upper parts. The banner took up this color which grew deeper and deeper till it reached the upper central part where it culminated in a strong dark pink spot. This gradation, in the same hue throughout the flower, from the very light to the very dark pink gave an indescribable delicacy of tone which, unfortunately, cannot be preserved in the pressed specimen. It must be seen to be appreciated.— Walter Deane, Cambridge, Massachusetts.

Xanthium strumarium in Massachusetts.— For many years the name *Xanthium strumarium* L. was familiar to American botanists. By Michaux and by Pursh the name was used to cover all American clotburs; but by Torrey & Gray *X. strumarium* was said to be "more or less naturalized." In Gray's *Manual* for six editions the plant was included as it was, also, in the *Synoptical Flora,* where it was treated as "sparingly nat. from Eu.? or Ind?" More recently, however, since a more detailed study of *Xanthium,* the occurrence of true *X. strumarium* in the northeastern United States has proved so doubtful that the name has been dropped from our manuals.

On October 22nd last, while walking with a party of students along the beach near Crescent Beach station in Revere, Massachusetts, I was sufficiently impressed by the unusual aspect of a tall *Xanthium,* growing among the litter and seedling watermelon vines of such cosmopolitan habitats, to stop and examine it. The plant proved to be true *X. strumarium,* characterized by its tiny ovoid to subglobose burs 8–12 mm. long, much smaller than in any of the American species. There was a single large plant from which all who wished took specimens, and enough burs had scattered to start a large colony in 1913 should the fruits of this tropical and subtropical species survive the winter at Crescent Beach. Observations next autumn should be made by those who visit Crescent Beach.— M. L. Fernald, Gray Herbarium.

NOTES ON AMELANCHIER.

K. M. Wiegand.

In a recent paper [1] on *Amelanchier,* a designation of the type specimen of *A. humilis* Wiegand was inadvertently omitted from the original description of the species. This type is in the Gray Herbarium: rocks, lake shore near McKenney's, Tompkins County, New York, May 11 & 30, 1895. *K. M. Wiegand.*

Since the above cited paper on *Amelanchier* was published, the writer has again reviewed much of the previously studied material of

[1] Wiegand, K. M.— The Genus Amelanchier in Eastern North America. Rhodora, XIV, 117, July, 1912.

A. canadensis from the South and West together with much new material from the same region. The result of this study may throw some further light on the status of *A. alabamensis* Britton. It seems now probable that a certain amount of woolliness on the summit of the ovary must be admitted among the allowable variations of *A. canadensis* without, however, constituting a distinct variety. In the North the leaves of *A. canadensis* are usually acuminate or subacuminate and sharply toothed, while in the Southwest (in Missouri principally) they are often, but not always, blunter, broader and more shallowly toothed, as well as sometimes nearly glabrous. Traces of the wool upon the ovary were found in about one-fourth of all sheets representing each leaf-form. If this variation in wool accompanied one or the other variation in leaf-form, a varietal designation would be justified, but under the circumstances such a designation would seem in no wise warranted. Since no other species with woolly ovary is known from the Southwest, it would seem necessary to assume a certain amount of variability in *A. canadensis* with respect to this character of the ovary, rather than a hybrid origin of the character. The wool is rarely more than a trace, but in one specimen from Missouri it is moderately dense. The type specimen of *A. alabamensis*, therefore, would seem to be simply a normal example of this tendency in *A. canadensis.*

The leaves of *A. oblongifolia* have proved more frequently acute (but not acuminate) than was at first realized. Therefore, the reader should not be misled by the bluntness of the leaves selected for the illustration in the paper above cited.

The known range of *A. sanguinea* in Massachusetts has heretofore not included the region east of the Connecticut River, and, since this species is, so far as known, a calciphile, an extension of the range into the generally non-calcareus eastern portion of Massachusetts was not expected. It was, therefore, very interesting to find in the private herbarium of Mr. C. H. Knowlton a specimen of *A. sanguinea* from Groton, Mass. Mr. Knowlton states that several other plants which are usually calciphile, as for example *Potentilla fruticosa,* were found near by. An inspection of Dame and Collins' Flora of Middlesex County shows that among plants whose distribution is usually restricted to calcareous regions, the following have been found at Groton or on the same geological formation in the immediate vicinity: *Phegopteris hexagonoptera, Asplenium acrostichoides, Spiranthes lucida,*

Anemone cylindrica, Parnassia caroliniana, Ribes, americanum Potentilla fruticosa, Sanguisorba canadensis, and *Eupatorium urticaefolium.* It may, therefore, be inferred that limey soil exists locally in Groton and vicinity.

The observations of another summer have served to strengthen the writer's belief that crosses between species of *Amelanchier* frequently propagate themselves by seed, and become, therefore, definite local races. For example, in a brief visit to Woods Hole during the past summer, all the individuals of *Amelanchier* noticed were approximately alike, but combined characters of both *A. leavis* and *A. oblongifolia.* If one such specimen only had been found, it would have been ascribed unquestionably to a hybrid origin, but to find so many was perplexing. During the visit to Woods Hole, no specimens of typical *A. laevis* or of *A. oblongifolia* were seen, a fact which seemed to render a hybrid origin of this form very improbable. It must be remembered, however, that in so brief a visit, in midsummer, occasional typical specimens of these two species might have been easily overlooked; and that herbarium specimens show the existence of both species in the general region about Woods Hole. It must also be remembered that Woods Hole has been recently reforested,[1] a disturbance which might easily have resulted in a local change in dominance of *Amelanchier* types. All things considered, therefore, the assumption that the strain of *Amelanchier* in question originated by crossing, perhaps many years ago, and is now locally dominant, becomes very probable. In addition to this case at Woods Hole, at least two other very similar cases have been brought to the writer's attention during the summer. These examples illustrate very well the care necessary before a conclusion is reached that a certain local type cannot be the result of crossing.

In order to avoid confusion, it may be well to mention again that in the illustrations of *Amelanchier* in the July RHODORA, the coarse teeth of the first three species and the fine teeth of the other species are not so well brought out in the plates as in nature.

[1] Reforestation at Woods Hole, Massachusetts,— A Study in Succession, M. A. Chrysler. RHODORA VII, 121, July, 1905.

ERRATA.

Page	21,	line 33;	for *amplexicaule* read *amplexicaulis.*
"	22,	" 1;	for *Lemma* read *Lemna.*
"	26,	" 15;	for *verticellatus* read *verticillatus.*
"	39,	" 34;	*for* County. *read* County,
"	40,	" 9;	*for* Var. *read* var.
"	51,	" 11;	for *vernicosum* read *vernicosus.*
"	58,	" 20;	*for* ξ *read* ζ.
"	75,	" 5;	for *Cryptogamma* read *Cryptogramma.*
"	89,	" 24;	for *verticellata* read *verticillata.*
"	178,	" 35;	*for* Kunth *read* Knuth.
"	179,	" 10;	*for* Kunth *read* Knuth.
"	179,	" 31;	*for* Kunth *read* Knuth.
"	180,	" 5;	*for* Kunth *read* Knuth.
"	185,	" 24;	for *Tricupis* read *Tricuspis.*
"	187,	" 18;	*for* Hubm. *read* Humb.
"	228,	" 3;	*for* Sinott *read* Sinnott.

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